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The Instability of Hevea Latex

Paul Stamberger[1]

IN A study made at plantations in Malaya it was found that the cause of instability is not the same for both fresh and preserved latex. The autocoagulation of fresh latex, as it will be shown, is not caused by the acid formed by bacteria action on the serum constituents (autoacidification). Coagulation takes place, nevertheless, when decomposition of the serum constituents is prevented by the addition of strong antiseptics. These experiments carried out in 1938 and 1939 in Malaya support G. S. Whitby's[2] view that autocoagulation is not due to autoacidification, but is probably caused by enzyme action on the protein or other serum constituents of the latex.[3]

The behavior of preserved latex is entirely different. Coagulation on storage was found to be due to acid formation and neutralization of the preserving agent applied. Decomposition of serum constituents was found in cases when coagulation did not take place, which would naturally influence the further behavior of latex. The action of the preserving agents is not a simple one. Inhibiting bacterial growth and preventing decomposition are not enough to keep the latex in the liquid, colloidal state. In addition to antiseptics, chemical compounds which act specifically as coagulation preventatives must be present. E. Rhodes[4] recommends 0.1% ammonia in addition to sodium pentachlorophenate.[5] This small quantity of ammonia, as it was found, is the specific substance, probably enzyme poison, which prevents coagulation.

A number of additional substances in combination with sodium pentachlorophenate were tried out, and it was found that adjusting the hydrogen ion concentration on the alkali side was not sufficient to prevent coagulation, although bacterial decomposition was inhibited. Observing the changes in the specific conductivity of latex during storage was the most satisfactory method found to measure the value of preserving agents or combinations of preserving agents. An increase in the specific conductivity of the latex was found after a few days' storage provided that the preserving agent did not inhibit decomposition of the serum constituents. From this increase in the conductivity upon storage, it could be predicted whether or not the preserving agent tested would give satisfactory results, or whether or not the concentration of the preserving agent was sufficiently high.

Autocoagulation of Fresh Latex

During a period of one year a large number of samples were collected and examined. The collection was made two hours after tapping of the trees. No special precaution was made, and the collecting cups were cleaned and treated in the regular manner. The conductivity and pH of the samples were determined at the end of every hour as long as the samples remained uncoagulated. To determine the conductivity, the Wheatstone bridge method was used. The pH was determined either by the electrometric method, using calomel-quinhydrone electrodes, or by using Lyphan indicator strips, which have a sensitivity of 0.1-0.2.

No measurable increase in the conductivity of the samples could be observed before coagulation took place, indicating that no change in ionic concentration occurred. This shows that the decomposition products of the fresh latex did not split into ions.

Several samples did not show any change in pH after coagulation; while others showed a slight decrease. This change was never more than 0.2-0.3. The pH of fresh latex varied between 6.4 and 6.8, and such a slight decrease of the pH could not be the cause of coagulation, since the isoelectric point of fresh latex is lower.

To have further proof that coagulation was not caused by this decrease in the pH of fresh latex, the pH was adjusted, immediately after it was obtained from the tree, by the addition of KOH-Phthalate buffer solution to a lower value. No increase in the rate of coagulation was observed with these samples. The latex for this experiment was diluted to twice that of the original volume either with distilled water or with the buffer solution. The results are given in Table 1.

TABLE 1

pH of the Sample	Time for Coagulation*
6.4 (Diluted with water)	6- 8 hours
6.0 (Diluted with buffer solution)	6- 8 hours
5.6 (Diluted with buffer solution)	8-10 hours
5.2 (Diluted with buffer solution)	liquid after 10 hours but contains small flocculated particles

*The first figure represents the time for the beginning of coagulation, the second for its completion.

Still more conclusive evidence for the belief that autocoagulation of latex is not due to autoacidification was furnished when latex to which strong antiseptic, sodium pentachlorophenate, had been added was investigated. 0.3% of sodium pentachlorophenate was added to the fresh latex, the pH of which was increased to 7 because of the alkalinity of the antiseptic. Although coagulation took place in the same time as without the addition of antiseptic, in 6-8 hours, no change in the pH was observed,

[1] International Latex Corp., Dover, Del.
[2] *Kolloid-Z.*, 12, 147 (1913).
[3] P. Stamberger, *Nature*, 143, 520 (1939).
[4] *J. Rubber Research Inst. Malaya*, 8, 324-30 (1938).
[5] Marketed by Monsanto Chemical Co., St. Louis, Mo., under the trade name Santobrite.

even after 30 days, in the coagulated sample, and no odor of decomposition could be observed.

Since sodium pentachlorophenate inhibits bacterial decomposition without preventing coagulation, latex to which this product was added could be used to study the effect of other substances on the prevention of coagulation.

The following experiments were conducted on latex to which 0.3% sodium pentachlorophenate had been added after collection. As little as 0.1% of ammonia was satisfactory in preventing coagulation, but 0.05% was not effective. A much higher concentration of potassium hydroxide was necessary to maintain the latex fluid for more than a few days, although the pH after this addition is higher than in the case of ammonia. In some cases 0.3% potassium hydroxide was effective; in some cases as much as 0.5% was necessary. Other alkali substances such as sodium carbonate and sodium phosphate were totally ineffective even in concentrations as high as 2%. Oxidizing agents, however, were found to be more effective. Sodium perborate and hydrogen peroxide prevented coagulation in concentrations of 1 to 2%; the effective amount varied somewhat from sample to sample.

It was also possible to prepare a latex which did not coagulate without the use of any substance other than the antiseptic. In this case the serum constituents were mostly removed by dilution and rapid reconcentration of the latex. Immediately after collection the latex was diluted with an equal volume of sodium pentachlorophenate solution, adjusting the concentration of the sodium pentachlorophenate to 0.3% of the latex. This product was reconcentrated to the original volume by creaming. This procedure was repeated three times on the day the latex was received. The product was free from any added alkali and had a pH of 7. No coagulation, only slight thickening, could be observed after 90 days of storage.

In view of the experiments conducted it can be concluded that Whitby's view of autocoagulation was correct. The autocoagulation of latex is not due to acid action. No direct proof for an enzyme action can be presented; however, such an action is highly probable and would explain the behavior of latex. The similarity to other phenomena, such as the curdling of milk and coagulation of blood, also supports this assumption. Ammonia acts as an enzyme poison, and the increase of the pH on the alkali side is not the responsible factor in preventing coagulation. Oxidizing agents destroy the enzymes and thus prevent coagulation. Removal of serum constituents, which could be coagulated by enzymes, and probably the enzymes too, was also effective in preventing coagulation.

Whether enzymes are present in the latex when it is formed in the tree, or are produced by bacterial action after tapping, is not known.

Behavior of Preserved Latex

For determining the rate of decomposition in preserved latex, measurements of conductivity and determinations of free alkali were carried out. The nature of decomposition in preserved latex is such that the conductivity increases and the free alkali, if present, decreases with progressing decomposition. This neutralization of free alkali can eventually lead to complete coagulation. Coagulation will not take place, however, even in the case of insufficient preservation of latex, when the quantity of alkali added initially is in excess of that which could be neutralized by the products formed by decomposition. Thus, latex preserved with 0.3% of ammonia did not coagulate although the free alkali content decreased appreciably upon standing. The decomposition products which form salts with the alkali dissociate into ions and cause an increase in the conductivity of the latex. The decomposition of serum constituents and the new products formed change the mechanical and chemical stability of latex. The determination of conductivity during storage of latex gave an excellent indication of the rate of decomposition. No attempt was made to identify the chemical nature of the decomposition products. The odor, however, indicated that they are to a large extent amino acids.

Results are given for determinations carried out with latices preserved with different quantities of ammonia and also for those preserved with different combinations of ammonia and sodium pentachlorophenate in Tables 2 and 3.

TABLE 2. LATEX PRESERVED WITH AMMONIA

Change in Free Alkali upon Storage

FREE NH_3 IN %							
0	4 Days	7 Days	10 Days	13 Days	19 Days	25 Days	31 Days
0.14	0.03	coagulated					
0.18	0.9	0.05	coagulated				
0.30	0.25	0.20	0.17	0.17	0.15	0.15	0.15
0.44	0.42	0.40	0.37	0.37	0.37	0.31	0.31
0.55	0.54	0.54	0.52	0.51	0.50	0.46	0.46
0.60	0.59	0.59	0.57	0.57	0.57	0.56	0.56
0.71	0.70	0.70	0.70	0.67	0.65	0.65	0.65
0.80	0.77	0.77	0.77	0.76	0.75	0.75	0.75

Change in the Specific Conductivity

Increase in the Specific Conductivity in $\frac{\text{Mhos}}{10^4}$

Free NH_3 Initially Present %	4 Days	7 Days	10 Days	13 Days	19 Days	25 Days	31 Days
0.14	coagulated						
0.18	29	coagulated					
0.30	24	..	49	63	65	76	78
0.44	5	..	15	18	18	31	32
0.55	4	..	14	22	22	22	22
0.60	0	..	0	0	12	17	19
0.71	0	..	0	0	10	10	10
0.80	0	..	0	0	10	10	10

TABLE 3. LATEX PRESERVED WITH AMMONIA AND SODIUM PENTACHLOROPHENATE

Free Alkali (in %) and Increase in the Specific Conductivity in $\frac{\text{Mhos}}{10^4}$ after Storage

Preserving Agents		7 Days		15 Days		35 Days		54 Days	
C_6Cl_5ONa %	NH_3 %	%	Mhos $/10^4$	%	Mhos $/10^4$	%	Mhos $/10^4$	%	Mhos $/10^4$
0.1	0.12	0.06	19	0.03	23	coagulated			
0.2	0.12	0.11	0	0.10	0	0.10	3	0.08	3
0.3	0.12	0.11	0	0.10	0	0.10	3	0.10	3
0.1	0.21	0.14	19	0.11	19	0.10	22	0.10	22
0.2	0.21	0.20	2	0.18	2	0.18	4	0.18	4
0.3	0.21	0.20	0	0.18	2	0.18	2	0.18	2
0.1	0.29	0.25	13	0.20	17	0.20	19	0.20	19
0.2	0.29	0.27	2	0.26	2	0.24	5	0.24	5
0.3	0.29	0.27	0	0.26	0	0.26	0	0.25	2

The initial specific conductivity of latex varies after preservation between 40-50 Mhos$\times 10^{-4}$ since the conductivity of fresh latex is also a variable figure.[6] The free alkali was determined by distillation into 0.1N $\cdot$ H_2SO_4 and then titrating with methyl red as an indicator.

From the results presented in the Tables 2 and 3 it is evident that sodium pentachlorophenate in combination with ammonia, even in relatively low concentrations, is more effective in preventing decomposition in latex than ammonia alone.

Conclusions from conductivity measurements can be drawn only when this figure is known. In the case the initial conductivity of latex is not known, the presence of decomposition products in latex can be determined by potentiometric titration of the buffer substances formed as recommended by H. F. Jordan.[7]

The above work was carried out while the author was temporarily engaged by the Dunlop Plantations, Ltd., in Malaya, and he is indebted to this company for permission to publish the results.

[6] C. Rae, *Analyst*, 53, 330, 487 (1928).
[7] "Proceedings of the London Rubber Technology Conference, 1938," p. 111.

Census of Manufactures—1939

TWO of the reports published here are among the 75 on national defense industries to which the Bureau of the Census is giving the right of way at the request of the National Defense Advisory Commission. A third report, also presented here, covers "Rubber Boots and Shoes," which while not on the selected defense list, is published now because of its present availability. A fourth report on the rubber industry, covering "Rubber Products not Elsewhere Classified," is also included in the commission's list of defense industries and is scheduled for early release by the Bureau of the Census. EDITOR'S NOTE.

Preliminary Reports on Rubber Tires and Inner Tubes, Rubber Boots and Shoes, and Reclaimed Rubber, Comparing 1939 with 1937 . . .

The following reports, compiled from returns of the Census of Manufactures for 1939, were released last month by Director William Lane Austin, Bureau of the Census, Department of Commerce. All figures for 1939 are preliminary and subject to revision.

The decreases in the number of wage earners and wages may be partially accounted for by the fact that the 1939 Census of Manufactures questionnaire for the first time called for personnel employed in distribution, construction, etc., separately from the manufacturing employes of the plants. It is not known how many of the wage earners reported in 1937 were engaged in distribution and construction and how many were engaged in manufacturing. Employes of the plants reported as engaged in distribution and construction activities for 1939 are not included in this preliminary report, but will be included in the final report.

Tires and Inner Tubes

Manufacturers of rubber tires and inner tubes in the United States reported a moderate decrease in employment, a slight decrease in wages, and a slight increase in production, for 1939 as compared with 1937.

This industry, as constituted for census purposes, includes establishments primarily engaged in the manufacture of pneumatic tires and inner tubes, and solid and cushion rubber tires for any class of vehicle.

The wage earners, primarily engaged in manufacturing in this industry in 1939, were 54,115, a decrease of 14.5% compared with 63,290 reported for 1937; and their wages, $89,773,503, were less than the 1937 figure, $96,706,731, by 7.2%.

The value of products of the industry for 1939 amounted to $580,928,993, an increase of 0.9% as compared with $575,860,262 reported for 1937.

Summary statistics for 1939 and 1937 are presented in Table 1. Detailed statistics on production are given in Table 2.

TABLE 1. SUMMARY FOR THE INDUSTRY: 1939 AND 1937

	1939	1937	% of Increase or Decrease
Number of establishments	53	46	(*)
Salaried personnel[1]	9,016	10,952	—17.7
Salaries [1,2]	$23,250,768	$25,323,979	— 8.2
Wage earners (average for the year)[3]	54,115	63,290	—14.5
Wages[2,1]	$89,773,503	$96,706,731	— 7.2
Cost of materials, supplies, fuel, purchased electric energy, and contract work[2]	$349,286,866	$366,858,443	— 4.8
Value of products[2]	$580,928,993	$575,860,262	0.9
Value added by manufacture[4]	$231,642,127	$209,001,819	10.8

* Per cent. not computed where base is less than 100.
[1] No data for employes of central administrative offices are included.

TABLE 2. PRODUCTS, BY KIND, QUANTITY, AND VALUE: 1939 AND 1937

	1939	1937
1. Rubber Tires and Inner Tubes Industry, all products, total value	$580,928,993	$575,860,262
2. Rubber tires and inner tubes, value	$497,636,438	$478,770,897
3. Other products not classified in this industry	$83,292,555	$97,089,365
Tires and inner tubes, total value	$497,636,438	$478,770,897
Pneumatic tires and casings:		
Motor-vehicle, except motorcycle and bicycle:		
Total number	58,372,275	54,113,445
Total value	$435,303,639	$412,765,798
Passenger-car:		
Number	49,166,077	45,668,599
Value	$269,241,421	$253,270,878
Truck and bus:		
Number	8,178,568	7,702,436
Value	$155,834,737	$156,459,385
Airplane:		
Number	30,405	32,710
Value	$544,823	$667,985
All other:		
Number	997,225	709,700
Value	$9,682,658	$2,367,550
Motorcycle and bicycle:		
Single-tube tires:		
Number	1,655,503	1,654,216
Value	$1,202,485	$1,390,700
Casings:		
Number	4,557,455	3,402,263
Value	$3,384,735	$3,191,864
Inner tubes:		
Passenger-car, truck, and bus:		
Number	51,016,763	52,372,908
Value	$52,510,944	$55,739,387
Airplane:		
Number	27,192	25,026
Value	$104,961	$101,912
Motorcycle and bicycle:		
Number	4,404,351	3,397,286
Value	$1,532,157	$1,186,697
All other:		
Number	645,737	167,906
Value	$1,343,332	$470,135
Solid and cushion tires, all types, value	$2,254,185	$3,924,404

Rubber Boots and Shoes

Manufacturers of rubber boots and shoes reported moderate decreases in employment, wages, and production for 1939, as compared with 1937.

This industry, as constituted for census purposes, includes establishments primarily engaged in the manufacture of all rubber footwear, waterproof fabric-upper footwear, and other fabric-upper footwear which has rubber soles.

The wage earners, primarily engaged in manufacturing, employed in this industry in 1939 numbered 14,861, a

[2] Profits or losses cannot be calculated from the census figures because no data are collected for certain expense items, such as interest, rent, depreciation, taxes, insurance, and advertising.
[3] The item for wage earners is an average of the number reported for the several months of the year and includes both full-time and part-time workers. The quotient obtained by dividing the amount of wages by the average number of wage earners should not, therefore, be accepted as representing the average wage received by full-time wage earners.
[4] Value of products less cost of materials, supplies, fuel, purchased electric energy, and contract work.

decrease of 19% compared with 18,356 reported for 1937; and their wages, $16,801,537, were less than the 1937 figure, $20,421,676, by 17.7%.

The value of products of the industry for 1939 amounted to $49,980,591, a decrease of 22.5%, as compared with $64,455,332 reported for 1937.

Summary statistics for 1939 and 1937 are presented in Table 3. Detailed statistics on production are presented in Table 4.

TABLE 3. SUMMARY FOR THE INDUSTRY: 1939 AND 1937

	1939	1937	% of Decrease
Number of establishments	13	12	(*)
Salaried personnel[1]	2,101	2,375	—11.5
Salaries[1, 2]	$3,479,190	$4,223,618	—17.6
Wage earners (average for the year)[3]	14,861	18,356	—19.0
Wages[2, 3]	$16,801,537	$20,421,676	—17.7
Cost of materials, supplies, fuel, purchased electric energy, and contract work[2]	$20,749,368	$27,474,556	—24.5
Value of products[2]	$49,980,591	$64,455,332	—22.5
Value added by manufacture[4]	$29,231,223	$36,980,776	—21.0

TABLE 4. PRODUCTS, BY KIND, QUANTITY, AND VALUE: 1939 AND 1937

	1939	1937
Rubber Boots and Shoes industry, all products, total value	$49,980,591	$64,455,332
Rubber boots and shoes	40,446,140	58,269,258
Other products (not classified in this industry)	9,534,451	6,186,074
Boots and shoes, total value	$40,446,140	$58,269,258
Rubber-soled canvas shoes:		
Total pairs	25,168,310	31,519,085
Total value	$13,700,571	$18,042,154
Base shoes:		
Pairs	8,579,553	7,784,834
Value	$3,292,672	$3,417,145
Lace-to-toe trimmed shoes:		
Pairs	5,889,112	11,246,272
Value	$3,660,480	$6,584,672
Plain oxfords and bals:		
Pairs	4,919,559	6,450,332
Value	$2,696,980	$3,717,658
Specialty oxfords and pumps:		
Pairs	5,780,086	6,037,647
Value	$4,050,439	$4,322,679
Rubber boots:		
Pairs	2,777,396	3,884,195
Value	$4,803,632	$7,624,737
Lumbermen's and pacs:		
Pairs	1,085,333	1,357,227
Value	$1,909,273	$2,808,002
Arctics and gaiters:		
Total pairs	15,181,439	20,125,312
Total value	$12,599,206	$18,346,752
Buckle and automatic:		
Pairs	3,770,347	4,566,856
Value	$5,149,852	$7,176,184
Style, rubber or cloth:		
Pairs	11,411,092	15,558,456
Value	$7,449,354	$11,170,568
Other shoes, rubber and footholds:		
Pairs	13,552,524	20,116,063
Value	$7,433,458	$11,447,613

Reclaimed Rubber

Manufacturers of reclaimed rubber reported moderate decreases in employment, wages, and production for 1939 as compared with 1937.

This industry, as constituted for census purposes, embraces establishments primarily engaged in the reclamation of rubber. (This industry does not include the reclamation of rubber in plants engaged in manufacturing rubber goods.)

The wage earners, primarily engaged in manufacturing, employed in this industry in 1939, were 1,072, a decrease of 14.8% compared with 1,258 reported for 1937; and their wages, $1,477,036, were less than the 1937 figure, $1,830,397, by 19.3%.

The value of products of the industry for 1939 amounted to $6,894,018, a decrease of 13.2% as compared with $7,942,934 reported for 1937. Of the value of products of the industry, $6,756,925, was the value of the 131,742,137 pounds of rubber reclaimed in 1939, a decrease of 12.9% in value and 4.6% in pounds compared with $7,758,292, the value of 138,120,211 pounds reclaimed in 1937.

Summary statistics for 1939 and 1937 follow.

SUMMARY FOR THE INDUSTRY: 1939 AND 1937

(Because they account for a negligible portion of the national output, plants with annual production valued at less than $5,000 have been excluded since 1919)

	1939	1937	% of Increase or Decrease
Number of establishments	10	9	(*)
Salaried personnel[1]	112	143	—21.7
Salaries[1, 2]	$386,207	$482,441	—19.9
Wage earners (average for the year)[3]	1,072	1,258	—14.8
Wages[2, 3]	$1,477,036	$1,830,397	—19.3
Cost of materials, supplies, fuel, purchased electric energy, and contract work[2]	$2,992,406	$4,172,377	—28.3
Value of products, total[2]	$6,894,018	$7,942,934	—13.2
Reclaimed rubber:			
Pounds	131,742,137	138,120,211	— 4.6
Value	$6,756,925	$7,758,292	—12.9
Products not classified in this industry, value	$137,093	$184,642	—25.8
Value added by manufacture[4]	$3,901,612	$3,770,557	3.5

Kelite Matrix Cleaner

KELITE MATRIX CLEANER, a product of the Vulcanizer's Division of L. J. White Co., 315 W. Hubbard St., Chicago, Ill., is said to provide for the quick and economical removal of carbon deposits and other foreign matter from mold matrices. It is claimed that the cleaner will not etch, deteriorate, damage, or in any way attack the metal itself. Also, Kelite is non-explosive and non-inflammable.

In use the matrix is immersed in a container of Kelite for a period of time dependent upon the volume of foreign deposit to be removed. Upon withdrawal from the container, the matrix is water-rinsed to remove the loose deposit. No sandblasting or similar treatment is required.

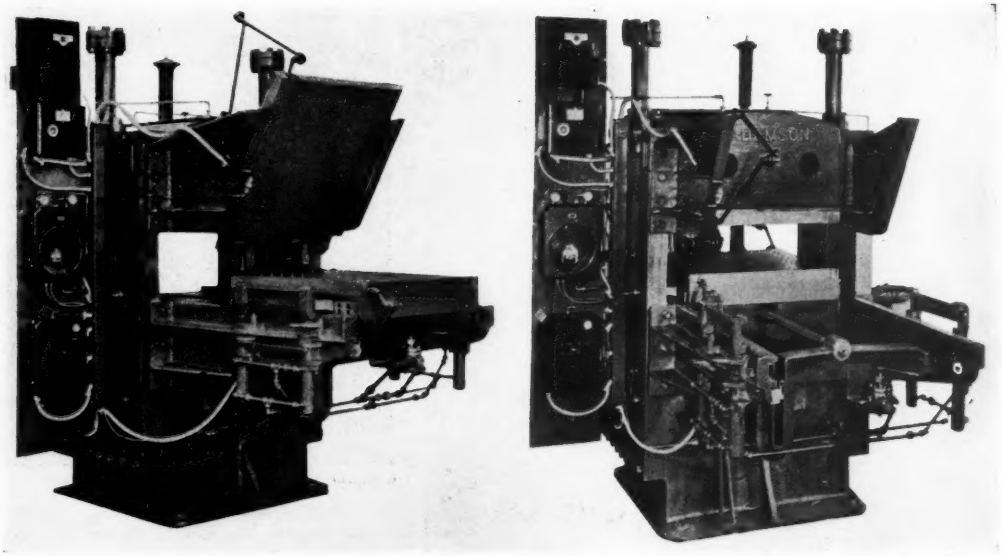
It is said that the cleaner can be used almost indefinitely with little or no waste, an economy made possible because the final removal of the deposit from the matrix is accomplished by water-rinsing after withdrawal from the Kelite, which precludes to a great degree the tendency to cause thickening or dilution of the cleaner.

Improved Cotton Tire Cord

A NEW cotton tire cord, said to have 300% longer flexing life than the best conventional cord of the same gage size, was recently announced by the National Cotton Council as the raw cotton industry's answer to the challenge of synthetic fibers in the truck and bus tire field. The Cotton Research Foundation, research agency of the Council, also announced that through patent rights the new cord-making processes will be made available to the entire tire industry. Revenues gained from royalties will be used to defray further research expense.

The new procedures for making cord are the result of three years of intensive study conducted by Dr. R. F. Nickerson at the Mellon Institute. It is claimed that laboratory findings, confirmed by actual road tests conducted in collaboration with the Firestone Tire & Rubber Co., show that in addition to its flexing properties the new cord has a 35% higher breaking strength than the best conventional cord, and very low sensitivity to both heat and moisture. In the new cotton cord, it is said, the high-polymer or long-chain nature of the basic cellulose molecules is unimpaired; thus plastic flow which results in tire growth is prevented and the danger from cord brittleness, when the tire becomes hot and dehydrated, is lessened. According to the statement, the cost of processing cotton by the new methods will probably be low, and it is expected that tires made from it will compare favorably in price with present cotton tires.

The Adamson Automatic Press



Adamson Automatic Press. *(Left)* Platens in Forward Position; *(Right)* Platens in Position above Ram

STREAMLINED efficiency and automatic operation have been keynotes in the rubber industry's development. The Adamson automatic press, sometimes called the Winegar press, is a noteworthy example of the machinery manufacturer's contribution to this progress.

Inception and Development

For many years rubber manufacturers watched press operators handling heavy molds and were aware that the operations involved were not only laborious, but distinctly unprofitable. It was a coincidence that E. M. Winegar, chief engineer of the Ohio Rubber Co., and F. L. Dawes, general manager of The Adamson Machine Co., were independently working on this problem several years ago and that both had the same idea for a solution: an automatic press that would provide maximum accessibility to the molds and complete automatic control; reduce the time to change molds; increase safety by reducing mold handling by the operator; and insure constant contact of the mold with the platens.

The development of this idea by builders of machinery brought about the design of an automatic press founded on a sturdy and rigid side-plate construction. In a complete molding cycle the operator has only to load the molds, press the control button to start the cycle and remove the vulcanized rubber articles. Runway brackets, equipped with tracks for the platens to travel on, were added. The lower runway brackets were made horizontal; while the upper brackets were curved so that the platens, and the mold sections, would open outward to a 60° angle. A lead screw, powered by a motor, was used to move the platens in and out of the press. To open the mold and eject the molded parts, a novel knockout device, consisting of a frame, plate, and pins, was developed. This device was designed to operate in conjunction with a push-back cylinder. The development was completed late in 1935 when the new press was placed on the market.

Operation

The operation of the Adamson automatic press is as simple as its design is unique. At the beginning of the cycle the press is open and the platens are out. The operator loads the mold with the uncured rubber compound and presses the button that starts the platen motor. This motor drives the platens and mold into a position directly under the press head and over the bolster and ram. With the platens in position, hydraulic pressure is automatically applied to the ram, closing the press. Intermittent releasing of hydraulic pressure to degas or "bump" the molds is conducted automatically, after which the press remains closed for the duration of the cure. Then the hydraulic pressure is released, and the press opens.

As the press opens, the push-back cylinders part the mold sections, and the knock-out device ejects the vulcanized articles from the mold cavities. The motor drives the platens forward to a position from which the operator may easily strip the mold. Mold changing is relatively simple.

Application

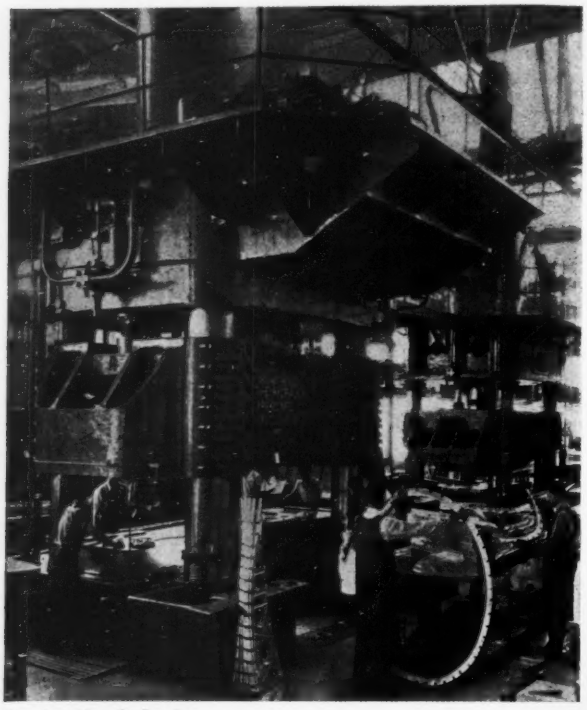
The application of this press is wide and varied as the following partial list of products which are being turned out in large volume indicates: motor mounts, bumper grommets, weather strips, valve stems, flat pads, body mounts, toy wheels, handle bar grips, fenderettes, gymnasium rings, nursing nipples, and door corner shields.

The press is particularly adapted to the production of articles that: (1) have relatively short cures (about 15 minutes); (2) are molded in large heavy molds; (3) can be strip or board loaded; (4) can be stripped from the molds in a sheet; (5) have inserts which would damage the mold if not held in proper position; (6) require delicate molds; (7) have long projecting pins; (8) require highly polished surfaces; (9) can be ejected by pins from the underside of the mold; (10) are produced on a large scale; and (11) have a short change time.

Rubber Slabs Speed Aircraft Production

RUBBER, manufactured into the largest pieces ever designed for commercial application by the Goodyear Tire & Rubber Co., Akron, O., for the Douglas Aircraft Co., Inc., Santa Monica, Calif., is making an important contribution to the ever-increasing pace of civil and military aircraft production.

The Guerin process,[1] as it is known, is a simple, rapid, and inexpensive method for cutting and forming sheet materials. In place of the usual set of mating dies, this process employs a single low-cost die and a flat, thick pad of rubber which adapts itself to a die on any form. By pressing a sheet of metal between the die and the resilient pad, it is possible to cut and form the metal to almost any desired shape.

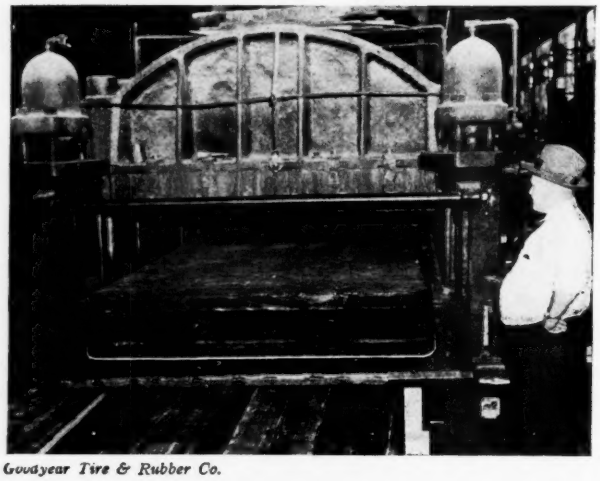


Douglas Aircraft Co., Inc.

Presses Which Fabricate Parts in Large Quantities at the Plant of the Douglas Aircraft Co., Inc.

The giant slabs of rubber weigh approximately 4,000 pounds and measure 160 inches in length, 57 inches in width, and are 11 inches thick. This application requires a rubber compound of great strength, high elongation, and toughness to resist the cutting action of the dies. It must be cured uniformly throughout, and the finished pad must be trimmed to exact measurements. This latter operation is being accomplished at Goodyear by a special technique developed by the company's engineers. For work requiring heated form blocks, a special heat resisting rubber is used. The 5,000-ton and 2,000-ton hydraulic presses used in the Douglas plant were designed especially for the adaptation of the process to aircraft work. While

[1] U. S. patents Nos. 2,055,077, 2,133,445, and 2,190,659; Belgium patent No. 416,047; British patent No. 467,365; Canadian patent No. 373,522; French patent No. 808,545; Italian patent No 341,660; and Swedish patent No. 97,628; others pending.



Goodyear Tire & Rubber Co.

Rubber Slabs for Metal Forming and Cutting Shown during Processing in Mechanical Goods Plant of Goodyear Tire & Rubber Co.

hydraulic press equipment is most satisfactory, toggle presses and drop hammers have been used with success on certain types of work.

In application, rubber is confined within a steel container; this container descends upon a lower press table where many types of dies may be operated simultaneously. When pressure is applied, the rubber conforms to the shape of the dies, thus forming and blanking metal sheets into their desired shapes.

The production economies and advantages resulting from this application of rubber are made possible by the fact that rubber is incompressible, but can be altered in shape without variation in volume.

The process makes possible an exceptionally high strength-weight ratio by forming sheet metal quickly into

(*Continued on page* 51)

Douglas Aircraft Co., Inc.

Typical Variety of Parts Fabricated by Guerin Process on Special Low-Cost Tooling

German Patents Relating to Synthetic Rubber-like Materials—VI

Law Voge[1]

THE synthetic rubber patents of Germany for the period 1909 through 1929 have been covered in preceding installments of this series. The German inventions of 1930 to date will now be treated as a unit in this and succeeding issues.

The bulk of the patents of this latest period deal with the polymers of the halogenated butadienes or their derivatives and with improvements and variations in emulsion polymerization technique. The subject of co-polymerization is not neglected in this group of patents.

A patent[2] on an interrupted emulsification process was applied for in January, 1930, by Dr. C. Heuck and assigned to I. G. Farbenindustrie, A.G., Frankfurt, covering the "Preparation of Polymerization Products." The claim states: "A process for polymerization of dienes in emulsion form, singly, or mixed together, or with other materials, but in the absence of hydrazine derivatives or their salts, in the presence of oxygen-yielding agents, characterized in that the polymerization of the diene is interrupted when considerable portions, e.g. 20-30%, of unpolymerized diene is still present." *Example:* liquid butadiene, 90 liters, oleic acid, three kilograms, and stearic acid, three kilograms, are combined, and the solution is emulsified in 150 liters of aqueous ammonia (½%) in an appropriate emulsifier. After adding 3.6 kilograms of hydrogen peroxide (30% strength) to this emulsion, it is heated to 40° C. for three days, when the unpolymerized butadiene is removed by pressure lowering. The remaining synthetic latex, after coagulation with acetic acid, yields a polymerization product which shows excellent mechanical properties after vulcanization. Instead of hydrogen peroxide, benzoyl peroxide can be used.

Drs. W. Bock and E. Tschunkur assigned to the I. G. in January, 1930, a patent[3] on a "Process for the Preparation of Rubbery or Gutta-Percha-like Materials." The inventors state that it has been found that the polymerization of the rubber hydrocarbons such as butadiene, isoprene, dimethylbutadiene, etc., as well as mixtures of these hydrocarbons or their mixtures with olefine-benzenes, in the emulsion process, can be strongly affected by organic chlorine compounds. In carrying out the polymerization in emulsions with aqueous solutions of the emulsifying agents in the presence of organic chlorine compounds or mixtures, the rubber yield is quite generally increased, and with high chorine-content compounds, especially those of the aliphatic series, quantitative yields can be obtained. Appropriate for this purpose are the most varied classes of organic chlorine materials, for instance, hydrocarbon chlorides, chlor-aldehydes, -acetals, -alcohols, -acids and their salts, etc. This apparently catalytic effect, to increase considerably the yield in polymerizate, as well as the polymerization velocity, is accomplished in many cases with high chlorine compounds—even by very small amounts, for instance, less than 1% by weight of that of the hydrocarbon to be polymerized, and this effect is not associated with definite solubility relations of the chlorine compounds employed in the hydrocarbons or in the aqueous phase and is, to a large degree, independent also of the nature of the emulsifying agent. Thus, for instance, a very definite effect is produced—not only with Cl-hydrocarbons (e.g., CCl_4) miscible in every proportion with the hydrocarbons and insoluble in water, but also with the compounds (e.g., chloralhydrate, trichloracetic acid or its sodium salt, etc.) difficultly soluble or insoluble in hydrocarbons, but in water readily soluble. All these materials can increase very considerably or make quantitative the yield in rubber from the hydrocarbons, and in conjunction with the most varied emulsifying agents (e.g., of emulsion-forming salts of the class of soaps, salts of alkyl aryl sulphonic acids, salts of sulphurated oils or of organic bases with inorganic or organic acids, albuminous materials, saponins, etc.).

The claim reads: "Process for the preparation of rubbery or gutta-percha-like substances by the polymerization of butadiene hydrocarbons, alone or mixed together, or with olefine benzenes, by an emulsion process, characterized in that the polymerization is carried out in the presence of organic chlorine compounds, especially high-chlorine aliphatic compounds which do not contain the chlorine linked in the form of a salt."

Example 1: 150 kilograms of butadiene and 15 kilograms of hexachlorethane (Cl_3C-CCl_3) are emulsified with a solution of 15 kilograms of sodium stearate in 150 kilograms of water and polymerized at slightly elevated or ordinary temperature. After five days there is obtained in quantitative yield a polymerizate varying greatly in properties from ordinary butadiene rubber that can be worked to plates on the rolls, in thin layers is transparent, has a gutta-percha-like appearance, and can be kneaded like paraffin. Without the use of the hexachlorethane, the yield under otherwise identical conditions is only 45% of the theoretical, and by extending the period of polymerization this can be increased but very little. All together, ten examples are presented in this patent. Other reagents proposed for use are: dichlorethylene, chlorobenzene, carbon tetrachloride with saponin, carbon tetrachloride with casein, carbon tetrachloride with styrol and saponin, carbon tetrachloride with glue and sodium-isobutyl-naphthalene sulphonate, chloral hydrate and styrol, sodium trichloracetate, and trichloracetic acid.

In January, 1930, Dr. K. Meisenburg assigned to the I.G. application for patent[4] on a "Process for the Preparation of Rubbery Masses from Butadiene Hydrocarbons." The purpose to obtain a product easily made into sheets on the rolls and readily taking up fillers, of the class of emulsion-polymerizates of butadiene. The claims read: "(1) Process for the preparation of rubbery masses from butadiene hydrocarbons or their mixtures, optionally together with olefine benzenes, characterized in that the specified materials are polymerized in the presence of unsaturated ketones of the general formula $\begin{matrix} R_1 \\ R_2 \end{matrix} > C = \underset{\displaystyle R_3}{\overset{\displaystyle |}{C}} - COR_4$ in which R_1, R_2 and R_3 signify hydrogen, alkyl, or aryl, and R_4 signifies alkyl or aryl. (2) Process as in Claim (1) characterized in that the material to be polymerized is subjected to emulsion polymerization."

[1] Research chemist and engineer, Washington, D. C.
[2] No. 596,769, granted May 9, 1934.
[3] No. 532,271, Aug. 22, 1931.
[4] No. 543,343, Feb. 4, 1932.

Example: 8.3 parts by weight of butadiene and 2.52 parts by weight of methyl-methylene-ethyl-ketone are shaken for some days with eight parts of 3% diethyl-amino-ethoxyoleyl-anilide-hydrochloric acid solution at 60° C. The polymerizate is produced in quantitative yield and rolls and vulcanizes very well. In four other examples presented magnesium and sodium oleates and benzal-acetone form components.

A "Process for the Preparation of Polymerization Products of Diolefines" is the title of patent application[5] of February, 1930, of Dr. G. Ebert, et al, and assigned to the I.G. This patent forms a supplement to patent 575,439.[6] The purpose is to insure quiet polymerization in the sodium process. Two claims were granted as follows: (1) Expansion of the 575,439 patent process characterized in that here instead of unsaturated ethers soluble in butadiene hydrocarbons, other compounds are used which can transform metallo-organic compounds by substitution of the metal atom, especially those of the general type: Me·(diolefine)$_x$·Me or R·(diolefine)$_x$·Me, R signifies an inorganic radical. (2) Further development of the process of Claim (1) characterized in that the polymerization is performed in the presence of alkaline metal hydrides or metallo-organic compounds.

In the first example presented, 1,000 parts of butadiene in the presence of 0.3-part of thiophene are polymerized using four parts of sodium, for 1½ days in a revolving autoclave. The reaction proceeds very quietly, and a product with good workable properties is obtained. Dependent upon the proportion of thiophene added is the degree of polymerization produced. These products are soluble in benzene. The viscosity of the solutions is inversely proportional to the amount of thiophene used. In another example, 1,000 parts of butadiene are polymerized for 1½ days in the presence of ½-part of hydrocyanic acid and four parts of sodium. In a third example, 1,000 parts of butadiene and four parts of sodium in the presence of ten parts of acrilic acid nitrile are polymerized in a revolving autoclave for 16 hours. A fourth example employs 1,000 parts of butadiene and 0.7-part of benzyl cyanide polymerized with four parts of sodium in a revolving autoclave for two days. In the final example, 1,000 parts of butadiene are mixed with four parts of sodium, and after polymerization is begun one part of methyl acetylene is added, and polymerization continued for two days.

Drs. Meisenburg and Bock, in April, 1930, assigned to the I.G. application for patent[7] on a "Process for the Preparation of Rubbery Masses," a supplement to patent 570,980.[8] The claim reads: "The process of patent 570,980 changed in that for olefine benzenes, olefine naphthalenes are used and optionally, the rubbery masses so obtained are vulcanized in the presence of highly dispersed fillers."

Example: Parts by volume, butadiene-1.3, 85, alpha-vinyl-naphthalene, 10, sodium oleate solution (10%) (aqueous), 100, sodium hydroxide solution (normal), three, emulsified in a pressure vessel and polymerized while subjected to continuous shaking for five days at 60° C. The yield is 90% of the theoretical, of a cream-like paste, dispersible in water, and can be coagulated by acidifying or chilling. Vulcanizing with gas carbon filler, a soft rubbery mass of great strength and elasticity is obtained. Two other similar examples are presented.

"Process for the Preparation of Rubbery Substances" is the title of two applications for patent in July, 1930, by Drs. Tschunkur and Bock, and assigned to the I.G. The purpose of the first[9] is to limit the aqueous phase in the emulsion polymerization process of butadiene hydrocarbons. The claim states: "A process for the preparation of rubbery substances by polymerization of butadiene-1.3 or its homologs, or mixtures of these hydrocarbons with other polymerizable substances and using salts as emulsifying agents characterized in that the polymerization is carried out in the presence of small amounts of water insufficient for complete dissolving of the emulsifying agents and for formation of an emulsion."

Example: 150 parts by weight of butadiene, 15 parts of sodium stearate, ten parts of water, are polymerized with shaking at 60-70° C. nine to ten days. The product is a solidly cohering polymerizate in yield of 60% of the theoretical. In three other examples presented, styrol, amylether, caustic soda, hexachlorethane form components. Dimethylbutadiene is also treated with sodium stearate, hexachlorethane, and water.

The second invention[10] likewise covers the use of very limited amounts of water to prevent the presence of a liquid aqueous phase. The claim reads: "Process for the preparation of rubbery masses by the polymerization of butadiene or its homologs, or mixtures of these hydrocarbons with other polymerizable materials in the presence of emulsification-active agents of non-salty nature in the presence of small amounts of water insufficient for dissolving completely the emulsifying agent and for forming emulsion, characterized in that the polymerization is carried out with the addition of polymerization favoring agents." *Example:* 150 parts by weight of butadiene, 10 parts of saponin, three parts of trichloracetic acid, and five parts of water are polymerized while shaken at 60° C. for eight days. A 90% yield of a reddish polymerizate is obtained, and which is readily formed to sheet on the rolls. In other examples, styrol, vinyl-tetrahydro-naphthalene, caseine, egg albumin, and colloidal manganese dioxide form components.

A "Process for the Polymerization of Unsaturated Compounds," patent application[11] in January, 1931, of Drs. Pummerer and Kehlen, of Erlangen, exceptionally, is not assigned to the I.G. or any other group. The inventors state that the polymerization of synthetic and natural rubber by light is known. It can be accelerated and performed at lower temperature if organic carbonyl compounds of the aldehyde or ketone classes are added. The claim states: "Process for the polymerization of unsaturated hydrocarbons such as butadiene, styrol, rubber, or gutta percha (balata) or their mixtures alone, together with diluents or solvents or in aqueous emulsion, characterized in that the hydrocarbons with the addition of small amounts of organic carbonyl compounds, optionally under pressure and with the exclusion of air are illuminated until the desired degree of polymerization is reached."

Example 1: Ten parts by weight of isoprene are emulsified in 15 parts by weight of a 10% aqueous solution of potassium stearate and 3.7 parts by weight of normal sodium hydroxide solution and illuminated in a closed container after the addition of 0.003-part of eosin (calculated with respect to the isoprene content). Using a 200-watt lamp and 38° C., the vessel contents (containing air above the liquid surface) can be coagulated with acetic acid in 17 hours. The product is firm and is washed with methanol. Without the eosin, under the same procedure, only a very soft slimy product results, and the yield is not one-fifth that of the above. *Example* 2. Ten parts by weight of styrol and 0.003-part of benzanthrone are illuminated with a 200-watt lamp four days. A considerable increase in the viscosity occurred. Another experiment, without the benzanthrone, showed no change in

(*Continued on page* 48)

[5] No. 592,096, Feb. 1, 1934.
[6] See India Rubber World, Sept. 1, 1940, p. 43.
[7] No. 573,568, Apr. 3, 1933.
[8] See India Rubber World, Sept. 1, 1940, p. 43.
[9] No. 542,646, Jan. 27, 1932.
[10] No. 542,647, Jan. 27, 1932.
[11] No. 576,141, May 8, 1933.

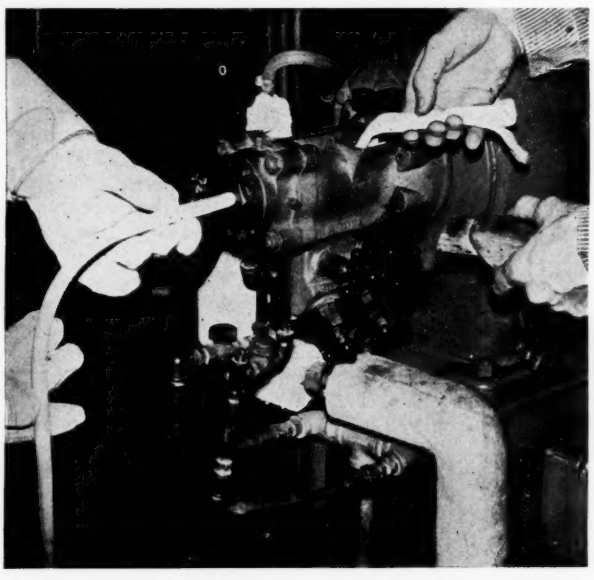
Butyl Rubber Characteristics Revealed

BUTYL rubber is produced by copolymerizing olefins with small amounts of diolefins to give just enough unsaturation for vulcanization. The new synthetic differs from natural rubber chiefly in degree of unsaturation. Like natural rubber, butyl rubber is 100% hydrocarbon and in this respect differs from those synthetic rubbers that are resistant to swelling in petroleum solvents. These facts were revealed on September 9, in Detroit, Mich., before the one hundredth meeting of the American Chemical Society, in a paper entitled, "Butyl Rubber, a New Hydrocarbon Product," presented by P. K. Frolich and prepared in collaboration with R. M. Thomas, I. E. Lightbown, W. J. Sparks, and E. V. Murphree, all of the Standard Oil Development Co., Linden, N. J.

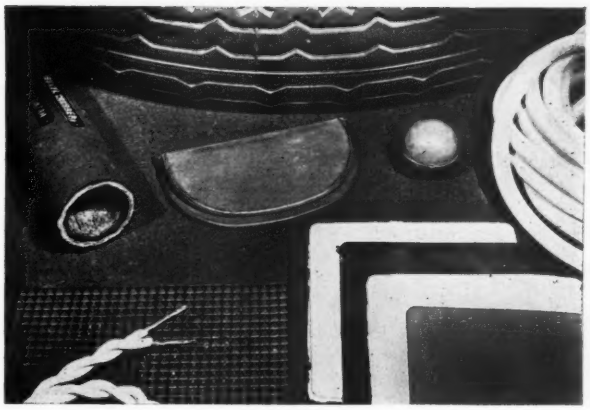
Unsaturation of Natural Rubber

In presenting this subject, Dr. Frolich first pointed out that the unsaturation of the natural rubber molecule makes possible vulcanization, so necessary in producing mechanical strength. However this very chemical unsaturation of rubber, it was emphasized, is its greatest shortcoming, and rubber is so highly unsaturated that it remains unstable and chemically reactive after it has been combined with the small amount of sulphur required for vulcanization. Overcoming unsaturation by the use of large amounts of sulphur results in the formation of hard rubber or ebonite, which is inelastic and non-pliable.

The most serious manifestation of natural rubber's unsaturation or chemical reactivity is deterioration on aging. The natural rubber molecule and its much-publicized synthetic semblances are, according to Standard chemists, either wholly or predominantly polymers of highly unsaturated diolefins, and it is to this diolefinic origin that these materials owe their extreme degree of unsaturation. In a ten-year research program, Standard has directed its efforts in overcoming this shortcoming of rubber.



Butyl Being Extruded into Tubing



Goods Made from Butyl Rubber

Controlled Unsaturation of Butyl Rubber

In their studies of chain-like polymers with no residual unsaturation, Standard's chemists recognized many important rubber-like properties. Such polymers may be made by uniting the simple olefins, but because of their saturated character they cannot be vulcanized with sulphur. Standard has now developed a method of copolymerizing olefins with small amounts of diolefins to give just the proper degree of unsaturation for vulcanization—but no more.

From this has come butyl rubber which, after vulcanization, is a product with substantially no residual chemical unsaturation. Thus butyl rubber is characterized by remarkable stability and durability which for many purposes make it superior to natural rubber and to other synthetics, it is claimed. By variations in the composition of raw materials employed, it is possible to obtain products that differ considerably in their detailed properties, but the basic characteristic remains the same insofar as limited unsaturation is concerned.

In the original announcement last June,[1] it was disclosed that butyl rubber was made from petroleum by processes more direct and simple than those required for production of other synthetic rubbers. In Dr. Frolich's paper he stressed the economic advantage of being able to utilize largely the simple olefins from refinery gases rather than the more expensive, highly purified diolefinic materials. Aside from its practical value, it was held, the discovery of butyl rubber will no doubt have far reaching theoretical consequences and act as a stimulus to further progress in rubber technology.

The new process has been worked out by the Esso Laboratories of the Standard Oil Development Co. entirely independent of any other synthetic rubber development either in this country or abroad.

Properties and Compounding

Butyl rubber differs from natural rubber and other synthetic rubbers in many respects. Free from impurities,

[1] "Butyl Rubber—A New Standard Oil Synthetic." INDIA RUBBER WORLD, July 1, 1940, p. 44.

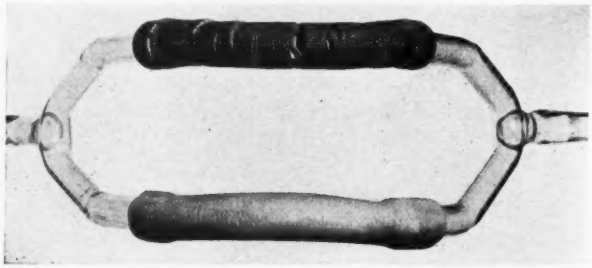
it is colorless and free from any odor or taste. A hydrocarbon like natural rubber, it is not resistant to swelling in petroleum solvents. However it is said to be more resistant to such simple aromatics as benzol and toluol than the synthetics now employed in the construction of gasoline dispensing hose. It is more resistant than natural rubber to many oxygenated compounds and to certain other solvents, such as ethylene dichloride.

By some modification in technique, butyl rubber may be processed and vulcanized in much the same manner as natural rubber. In general it vulcanizes somewhat more slowly than natural rubber. It may be more highly loaded than natural rubber with carbon black and other pigments to give products of a given hardness.

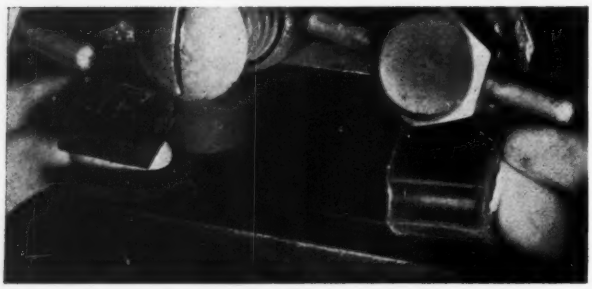
The tensile strength of butyl rubber is comparable to that of natural rubber in stocks which do not contain carbon black. As butyl rubber stretches much more than natural rubber for a given load, its strength per unit cross-sectional area at the point of break is actually much greater. Its tensile strength is not increased to the same extent as for natural rubber on the addition of large volumes of carbon black. Other properties, however, such as tear resistance and abrasion resistance, are affected much the same as with natural rubber.

Butyl rubber is readily molded into articles of intricate design, and its good tear resistance is an aid in removing such products from the hot mold. Its abrasion resistance may be made comparable to that of natural rubber, and it is claimed that it will flex without cracking at a lower temperature than any other rubber—natural or synthetic. Although more age-resistant than natural rubber, carbon black should be added to prevent butyl rubber from becoming tacky when exposed to sunlight. Such compounded stocks are said to be considerably more sunlight resistant than those of natural rubber.

Resistance to strong mineral acids is illustrated by the fact that hot concentrated nitric acid has no visible effect on butyl rubber during a time interval which is sufficient to make a similar sample of natural rubber disappear completely. As an insulating material, it is said to be superior to all other types of rubber, and its electrical properties are not adversely affected on immersion in water.



Natural Rubber Tubing *(Top)* Is Cracked after a Few Minutes Exposure to Ozone; But Butyl Rubber *(Bottom)* Is Intact after Several Hours



After 3,000,000 Flexures a Rubber Sample *(Left)* Has Been Broken; While the Butyl Rubber *(Right)* Shows no Sign of Failure

Butyl rubber is less permeable to both chemically active and inactive gases than natural rubber. It bounces much less than natural rubber at room temperature, but the rebound approaches that of natural rubber at 200° F.

The Esso Laboratories are still evaluating butyl rubber for many of its potential uses and are co-operating with tire manufacturers in determining the suitability of butyl rubber for tires.

Dr. Frolich and his collaborators conclude their discussion with the following remarks: "In the light of the achievements to date, we are justified in looking forward to the development of a series of synthetics, each one of which will exceed natural rubber in certain specific properties—so that in the aggregate these products will give us something superior to rubber as we know it today. We believe that butyl rubber possesses properties which will secure an important place for it in this synthetic picture.

"Future manufacturing plans will be dependent somewhat upon tests now in progress and to be undertaken more widely when the material is distributed among prospective users. The program which is being followed with respect to the evaluation of the product for commercial uses is to some extent being governed by national defense considerations."

Chemigum—A Butadiene Copolymer

In a talk before the National Farm Chemurgic Council in Cleveland, O., September 16, R. P. Dinsmore, of the Goodyear Tire & Rubber Co., revealed that Goodyear's recently announced synthetic rubber, Chemigum, is a modified Buna type. In the new product the use of butadiene has been retained, but several substitutes for the styrene and acrylonitrile, which are said to offer promise of much cheaper ultimate cost, have been developed. As to the production of Chemigum, much attention has been directed toward control of reaction processes to promote fast reaction and high yields, together with greatly increased plasticity without the aid of plasticizers.

Mr. Dinsmore pointed out in his talk the danger of undue optimism, created by over-enthusiastic press reports, regarding the solution of America's rubber supply and brought out the following points for consideration: present production capacities for synthetic rubber which do not exceed 1% of our rubber requirements; practice of specialty-purpose development rather than tire-use development; possibility of competition with a free rubber market where modern methods will permit a cost of 5¢ or 6¢ a pound. We should, Mr. Dinsmore urged, develop without delay our knowledge of the use and production of the most adaptable type of synthetic as a defense measure. Such a development, with no other future economic justification, must be financed and regulated by the government. This, according to Mr. Dinsmore, cannot fail to be injurious to the private interests immediately concerned, but there seems to be little disposition on the part of industry to hold back on this account. In the long run, the speaker pointed out, industry as a whole may profit by an intimate consideration and clarification of the whole synthetic problem. Like most of our defense problems, he concluded, the need is for intelligent, organized action.

Perbunan and Its Use—III

Fabrication and Specific Formulation . . . .

C. A. Klebsattel[1]

IN PARTS I and II of this article particular attention was given to the properties of Perbunan and the function of the various types of compounding ingredients in compounds made from this synthetic rubber. In this concluding part helpful suggestions will be presented on the processing of Perbunan, together with practical hints on how best to compound Perbunan to obtain specific properties.

Fabrication of Perbunan Compounds

All the usual fabrication methods applied to natural rubber may be used with equal success in handling Perbunan compounds. The precautions to be taken for various fabrication processes are much the same as with natural rubber, and some hints on specific processes are outlined below.

Press Curing

Press curing of Perbunan is outstandingly successful. The flow in the mold is superior to that of natural rubber compounds, and the surface finish is so good that its perfection is limited only by the condition of the mold surfaces. Large-scale users of Perbunan report consistently better results with press curing of Perbunan than with natural rubber because they get better conformity to mold contours, better surface finish, and finally because rejects resulting from imperfect mold flow are practically unknown. The plateau effect in the curing of Perbunan renders the time of cure less critical than with natural rubber since the overcure does not greatly lower the physical properties.

In extremely complicated molds where the finished article must be stretched to remove it, it is best to use a compound possessing good tear resistance. This normally will mean the use of hard reenforcing blacks, softeners which are elasticators, and choice of accelerators to give a tight cure. For best hot-tear resistance it is preferable to cure to a point just short of optimum conditions.

For a typical press-cured compound (Table 1), time-temperature relations for optimum cure are as shown in Figure 1.

TABLE 1

Perbunan	100.0
Coal Tar: Rosin; 1: 1	10.0
Dibenzyl Ether	10.0
Zinc Oxide	5.0
Stearic Acid	1.0
Sulphur	1.5
Channel Black	20.0
Semi-Reenforcing Black	40.0
Benzothiazyl Disulphide	1.3
Dibutylamine	0.3

Steam Curing

Steam curing of Perbunan compounds works perfectly well, generally yielding vulcanized stocks just a little harder than if the same stock is press cured. No special precautions are necessary in steam curing Perbunan although it is best practice to start the cure with an initial charge of relatively high pressure, high temperature steam to establish a quick initial set. Then the steam pressure may be tapered off for a longer time to complete the cure. This scheme minimizes any tendency toward porosity or blow-hole formation within the stock, particularly when hard channel blacks are present. Perbunan compounds which are to be steam cured should not contain any appreciable amount of calcined magnesia because its presence will tend to harden the compound progressively both during curing and on aging.

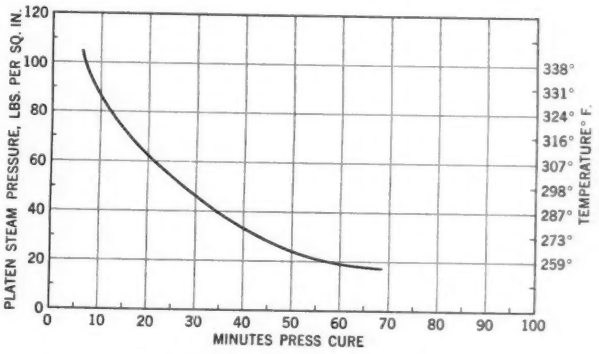


Fig. 1. Time-Temperature Relations for Optimum Cure of Typical Perbunan Compound

Calendering

Calendering or frictioning of Perbunan compounds presents no difficulty if they are designed for the purpose. In general, any normally plasticized Perbunan compound may be calendered into thin sheets without difficulty if the roll temperatures are suitably adjusted. The rolls for calendering or sheeting should be at a temperature of about 115 to 130° F.

Frictioning Perbunan stocks should be rather liberally plasticized to secure the necessary softness. Good results for frictioning on to duck or other fabrics usually are obtained if the top roll is at a temperature of about 115° F., the middle roll at about 130° F., and the bottom roll at about 115° F. A preliminary warm-up of the compound is, of course, desirable before starting to friction it onto fabric.

Extruding

Tubing or extruding of Perbunan proceeds very easily when the compound is plasticized with those softeners particularly recommended for this purpose. In general, the barrel and worm of the tuber should be thoroughly cold and the die should be only sufficiently hot to assure that the stock extrudes smoothly. If the die has a sharp lip, the sharp edge should be inside toward the worm to secure smoothest extrusion. This is in distinct contrast to natural rubber technique. Furthermore in tubing hose the pin which shapes the bore of the tube should terminate just outside or beyond the sharp inner edge of the die.

Clearance between the barrel and worm of the tuber should be normal and not so great as to cause undue churning and heating of the stock. Before the Perbunan stock is extruded it should preferably be warmed up on a mill, sheeted out, and cut into narrow strips, and then it may be dusted with zinc stearate before it is charged to the tuber.

[1] Chief chemist, Advance Solvents & Chemicals Corp., New York, N. Y.

Spreading and Dipping

Spreading and dipping Perbunan compounds are readily prepared from a wide range of unvulcanized stocks. Thus it is possible to spread or dip cements or solutions of such compounds as will give vulcanized goods ranging from very soft, resilient products to the consistency of hard rubber. There are three primary things to remember in preparing Perbunan cements; these are:

A. The Perbunan itself must be very thoroughly milled and broken down for such use. If it is not thoroughly broken down, it will neither dissolve readily nor give smooth solutions.

B. The plasticizers in the compound should preferably be those which act as true solvents or elasticators or at least have a swelling action on Perbunan. These include dibenzyl ether and the heavy coal tars.

C. Do not load Perbunan cement compounds excessively. Too much filler interferes with ready solution.

Suitable solvents for unvulcanized Perbunan prepared as above are benzol, toluol, methyl ethyl ketone, and most of the usual chlorinated solvents. Some ultra-accelerators are reactive with certain of the chlorinated solvents causing loss of vulcanizing ability. Any sort of acceleration may be employed with these cement compounds, depending upon the type of cure desired, that is whether ultra-accelerators are to be used for self-vulcanizing or normal acceleration for vulcanization by heat with or without pressure. It should be mentioned here that as a rule pure gum Perbunan compounds, or those which contain a small amount of fillers, will normally develop much higher tensile strengths, etc., when they are cast from solution and cured in hot air than the same compound will produce if press cured. This is particularly important in the manufacture of oil resistant super-aging gloves, sheeting, and similar products.

Hot air curing of Perbunan is applicable to articles formed by spreading or dipping in Perbunan cements or solutions. No special precautions, other than those observed under similar circumstances with natural rubber, are necessary.

Lamination

Lamination of Perbunan presents no difficulty whatever when the built-up object is press cured or formed by successive dippings or spreadings of cements. However in building up hose, belting, rolls, etc., properly plasticized Perbunan compounds should be used to attain suitable tackiness and bonding ability. This is covered in detail in another section of this article. In any case, it is always possible to bond successive plies of Perbunan compounds to each other through the aid of a solvent wash to soften the ply surfaces. Suitable solvent washes for this use are toluol, xylol, dibenzyl ether, methyl ethyl ketone, etc.

Bonding to Metal and Rubber

Metal bonding of Perbunan is very easy in the case of iron, steel, and ferrous alloys generally. An intermediate coat of chlorinated rubber is useful as a bonding agent. The metal surface should be thoroughly cleaned and free of grease in any case; it should preferably be sandblasted, pickled, or treated with an abrasive paper to produce a slightly roughened surface to improve the bond. Then there should be applied to the properly prepared metal surface two or three coats of a 15% solution of chlorinated rubber (125 cp. viscosity) dissolved in toluol. The best bond will result if before vulcanization, the raw Perbunan compound can be formed so that it will conform fairly well to the metal surface and hence flow as little as possible in the mold. It will be best to join the coated metal and the preformed Perbunan while the last coat of chlorinated rubber is at least still somewhat moist with solvent and tacky. If this assembly can stand for half an hour or so before it is cured, it will still further improve the bond.

Perbunan to be bonded to metal should preferably not contain channel black as the main filler. Higher zinc oxide than normal (15 parts zinc oxide on 100 parts of Perbunan) is generally desirable for metal bonding. This is especially true when the stock is accelerated with mercaptobenzothiazole.

Tie gums to unite plies of Perbunan and of natural rubber to each other are prepared in the usual manner by blending the two stocks. As a general rule, most satisfactory bond between plies of Perbunan and plies of natural rubber will result if the tie-gum stocks contain a higher proportion of Perbunan than of rubber.

Formulation of Perbunan Compounds for Specific Purposes

Through judicious choice of compounding ingredients in proper amount, it is possible to formulate Perbunan compounds to meet practically as wide a range of specifications on tensile, hardness, etc., as can be attained with natural rubber. In addition to these primary physical properties Perbunan will always give the further advantages of better resistance to oil, heat, fatigue, and aging as compared with natural rubber. Some notes on how best to compound Perbunan to obtain specific properties are listed below. These notes are necessarily incomplete, but they do outline the most essential points so far as our present knowledge permits.

Tensile Strength

Tensile strength of Perbunan depends primarily on the filler used. For maximum tensile strength it is necessary to use the hard, highly reenforcing channel blacks and to hold the softeners to a minimum consistent with processing the stock. Attaining the ultimate in tensile strength (5,000 pounds per square inch) will entail sacrifice of elongation, rebound elasticity, and extrudability. Therefore only in exceptional cases are the straight channel black loadings used in Perbunan. It is more common to use a combination of channel blacks and softer blacks. While the softer semi-reenforcing blacks do not produce so high tensile strength in Perbunan as the channel blacks do, they still are superior to any of the white or inert fillers such as zinc oxide, whitings, or clays. These last-mentioned materials produce tensile strengths far lower in Perbunan than do any of the blacks and in this respect differ from their usefulness in natural rubber.

Elongation and Modulus

Elongation and modulus of Perbunan is, as with natural rubber, largely dependent upon the amount and kind of fillers, the acceleration, and the state of cure. In general, Perbunan parallels natural rubber closely in these respects.

With any given filler an increase in the amount used produces increasing tensile strength and modulus up to a certain point without seriously interfering with ultimate elongation. The effect of the accelerators used and the period of vulcanization is much the same as with natural rubber. Certain accelerators give tighter cures which increase the modulus, and curing beyond the optimum point results in slightly lowering the ultimate elongation.

Hardness

Hardness of Perbunan compounds is fairly easily regulated through the amount and kind of filler used as well

as by adjustment of the sulphur content. Channel blacks, as a rule, produce the hardest stocks for a given volume loading, although it is easy to attain high hardness through the use of large amounts of other fillers including the inerts which, of course, do not give the high tensile strength and other desirable physical properties which the blacks confer. The sulphur content of a Perbunan compound also has a decided influence on its hardness. Normally two parts of sulphur on 100 parts of Perbunan is the maximum to be used. However if all other means of raising the hardness of a Perbunan compound fail, the use of more sulphur can be depended upon to accomplish the desired results. High sulphur for high hardness should be used only with the understanding that this practice will result in raising the modulus and lowering the elongation unduly. Furthermore the higher sulphur content will result in a loss of desirable high-temperature aging properties in such a compound.

Semi-hard Perbunan compounds may be produced through vulcanization with intermediate sulphur ratios in the range of 10 to 15 parts of sulphur on 100 parts of Perbunan. These semi-hard Perbunan compounds possess a soft, leathery feel, but they possess flexibility and pliability far superior to natural rubber compounds cured with corresponding sulphur content. These semi-hard Perbunan compounds mold up beautifully in press cures with perfect flow and a high mold finish. As mentioned previously, these high sulphur ratios should never be used where high temperature aging properties are of any importance.

Hard Perbunan compounds equal in hardness to hard rubber are easily made. A sulphur content of 30 parts or more on 100 parts of Perbunan should be used. Vulcanization without accelerators is possible through prolonged curing in a manner identical with natural rubber technology. For quicker results in curing it is desirable to use these same accelerators which are regularly used for hard rubber vulcanization. The accelerated hard Perbunan compounds will normally come out with a higher softening point than the unaccelerated mixes. In any case properly cured hard Perbunan compounds will always have a softening point much higher than that of hard rubber.

To attain the greatest hardness in hard Perbunan stocks, fillers such as carbon black, etc,, may be used. Powdered mica is particularly desirable as a filler for hard Perbunan compounds which must have the highest possible softening point. A definite overcure will result in increased resistance to swelling of these hard compounds by solvents. To obtain desirable tackiness and processing properties of the unvulcanized hard compounds, it is possible and often desirable to incorporate some plasticizers for the stock. For this purpose nondrying alkyd resins serve satisfactorily.

Permanent Set, Cold Flow, and Creep

Minimum values for permanent set in Perbunan compounds are obtained through loading with soft blacks having low reenforcing effect. Channel blacks will not give so good permanent set and cold flow characteristics to Perbunan compounds as do the soft blacks. The white, inert, and coated pigments or fillers are even more objectionable in this connection than channel black. As with rubber, a slight overcure of Perbunan compounds helps to keep permanent set values to a minimum. Furthermore acceleration to attain a tight, high modulus cure is desirable for Perbunan compounds which are to exhibit minimum permanent set. Plasticizers for the Perbunan compounds resistant to permanent set should be in the class of elasticators discussed earlier. Dibenzyl ether, etc., represent this type of plasticizer, and they are preferable to any resinous plasticizers where permanent set is of prime importance.

Cold flow and creep under tension or compressive loads amount to very little in Perbunan compounds. However, so far as compounding is concerned, the instructions immediately preceding for minimizing permanent set apply to compounds which must have desirable cold flow and creep characteristics. The use of soft blacks and of elasticators as plasticizers, high modulus, and a slight overcure are the essentials in seeking minimum cold flow.

Sun Checking

Sun checking of normal Perbunan compounds is less in general than that of natural rubber compounds. However it is always good practice to include in any Perbunan compound to be exposed to the weather or light a certain amount of wax. The commercial sun checking inhibitors such as Heliozone or Sunproof in amounts of around 2% on the Perbunan are useful. Ozokerite wax to the extent of 1½ to 2% works out well, as does the addition of about 2% of high melting point paraffin wax. Certain amorphous waxes also exhibit a marked protective action against the sun checking of Perbunan compounds. Up to the present there are no data to support a preference of fillers for resistance to sun checking.

Resistance to Heat and Cold

Heat resistance of Perbunan compounds is inherently superior to that of natural rubber products. Perbunan does not develop tackiness, or does reversion occur when it is exposed to elevated temperatures. The primary effect of prolonged exposure of Perbunan compounds to heat is to cause a gradual increasing surface hardness while the tensile strength is at first increased, then gradually decreased as the elongation and rebound elasticity fall off. At the present time maximum resistance of Perbunan compounds to high temperatures seems to be accomplished, through the use of a cure by tetramethylthiuram disulphide with little or no sulphur. For outstanding heat resistance such a cure should be bolstered by the presence of a ketone-amine antioxidant such as B-L-E, Aminox, or Antioxidant MB. Plasticizers used in heat-resistant Perbunan compounds should have low volatility at the expected service temperatures. Fillers have little influence on heat resistance.

Cold resistance of Perbunan compounds is in general similar to that exhibited by natural rubber compounds. For best cold resistance Perbunan should preferably be compounded so as to give relatively soft vulcanizates. Semi-reenforcing blacks and barytes are preferred as fillers. Plasticizers for cold resistant compounds should be elasticators or incipient solvents for the raw Perbunan, and these plasticizers should be chosen so that none are used which themselves solidify or freeze at temperatures encountered in service. Acceleration and cure should be such that a high modulus stock results, and a slight overcure is obtained.

Resistance to Solvents and Water Vapor

The swelling action of different type solvents on Perbunan compounds varies widely as brought out in the beginning of this series. While it is true that the more highly loaded a Perbunan compound is the less it will swell in a given solvent, this is much less important than with natural rubber compounding. There is no great difference between low and high loadings so far as solvent swelling is concerned. For minimum values of solvent swelling or absorption it is essential that Perbunan compounds be fully cured or even slightly overcured.

Anti-freeze liquid resistance is inherently good in the case of any Perbunan compound. None of the common alcohols and glycols used for anti-freeze purposes swells Perbunan appreciably. But many applications of Perbunan compounds to service in contact with anti-freeze liquids require good resistance to permanent set, cold flow, and heat. Attention should be paid to proper compounding of Perbunan to meet these requirements since the anti-freeze resistance will be excellent in any case.

Water vapor permeability of Perbunan compounds is not essentially different from that of natural rubber products. However in Perbunan the blacks are not the best fillers to use since talc gives superior results in this regard. The inclusion of small amounts of paraffin wax or metallic stearates are also helpful in reducing the water vapor permeability of Perbunan.

Perbunan-Natural Rubber Blends

While Perbunan is primarily useful as the sole basis for fabrication of mechanical and other goods, the question is often asked as to how blends of Perbunan and natural rubber behave. A little information on this point follows.

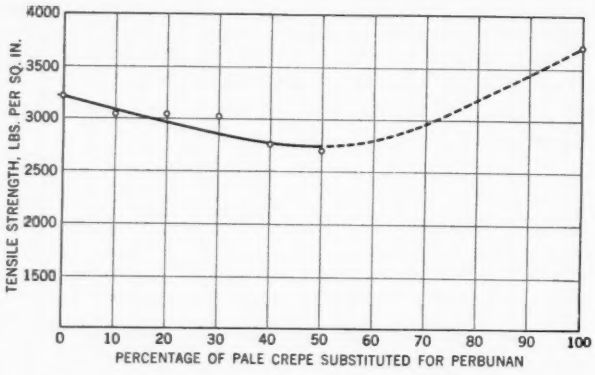


Fig. 2. Tensile Strengths of Perbunan-Rubber Blends

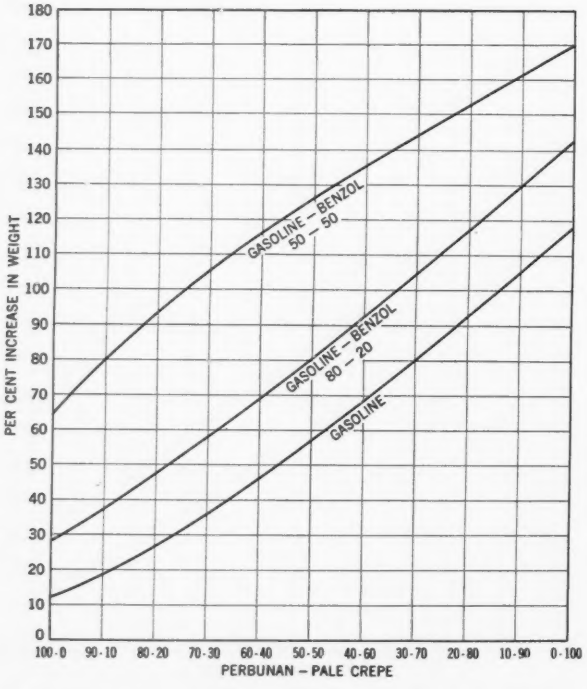


Fig. 3. Immersion of Perbunan-Rubber Blends in Gasoline and Gasoline-Benzol Mixtures for One Week

In the first place Perbunan and natural rubber may be blended together uniformly and perfectly and vulcanized together to give compounds which exhibit more or less the physical properties that one would expect of such mixtures. Secondly, minor proportions of rubber in Perbunan may serve admirably to improve processing characteristics such as tackiness for plying up fabrics and as a fairly odorless plasticizer for the Perbunan.

The primary effect of using any great amount of rubber together with Perbunan is to lower the resultant oil resistance and to detract seriously from the aging characteristics and ability to withstand high temperature service.

Figures 2 and 3 illustrate the results of diluting Perbunan with natural rubber in a specimen compound. Two stocks, one Perbunan, the other natural rubber, (Table 2) of similar composition and identical curing characteristics were blended in different proportions, vulcanized, and tested. The charts (Figures 2 and 3) give tensile strength and solvent absorption values of the Perbunan-rubber blends.

TABLE 2. PERBUNAN-RUBBER BLENDS

Perbunan Formula		Rubber Formula	
Perbunan	100.0	Pale Crepe	100.0
Duraplex C50-LV 100%	15.0	Zinc Oxide	5.0
Triphenyl Phosphate	5.0	Stearic Acid	2.0
Spheron Black	20.0	Paraffin	1.5
P-33 Black	40.0	Spheron Black	20.0
Zinc Oxide	5.0	P-33 Black	40.0
Stearic Acid	2.0	Sulphur	1.8
Paraffin	1.5	Altax	1.3
Sulphur	1.8	Dibutylamine	0.2
Altax	1.3		
Dibutylamine	0.2		

Both optimum cure 30 minutes @ 287° F.

German Patents

(*Continued from page 42*)

viscosity. The volatile part was removed in vacuum. Eight other examples are presented, six of which relate to natural rubber and two to styrol.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., entered the field of German synthetic rubber patents with an application filed on July 30, 1931, on a "Process for the Preparation of Polymerization Products of Halogenated Butadiene." The name of the inventor is not disclosed. The patent covers 20 pages with 11 claims, but as it is not a German invention, it requires no detailed discussion in this article.

Dr. Mueller-Cunradi and associates assigned to the I.G. in November, 1932, an application for patent[13] on a "Process for the Preparation of Diolefine Polymerizates." The claim covers polymerizing 2.3-dichlorbutadiene-1.3 obtained by treating tetrachlorbutane with hydrochloric acid. In the example presented, tetrachlorbutane is treated with potassium methyl alcoholate to form 2.3-dichlorbutadiene-1.3. This product is heated in a vessel at 30° C. until polymerization is ended. On the rolls a thin sheet of great strength is produced. Similarly the 2.3-dichlorbutadiene-1.3 is emulsified with water with the aid of an emulsifying agent and with the addition of hydrogen peroxide and shaken at room temperature until the desired polymerization is reached. A white powder is obtained readily soluble in toluene, which can be precipitated out by acetone. This can yield transparent films with thermoplastic properties. (*To be continued*)

[12] No. 641,468, Feb. 8, 1937, U. S. applications, Feb. 28 and May 14, 1931.
[13] No. 662,281, July 9, 1938.

The Value and Cost of Pneumatic Tires[1]

J. Brownlee Davidson[2] and Eugene G. McKibben[3]

AGRICULTURAL machines for many years have been quite generally equipped with steel transport wheels, these steel wheels having replaced the wooden wheels of an earlier period. At the present time many machines are being fitted with pneumatic tires which have come to be used universally on the automobile and extensively on the farm tractor. This paper has been prepared in connection with an extended study of pneumatic tires for transport wheels on farm machines and represents an effort to summarize the results of the researches completed in terms of economic relationships.

The researches on pneumatic tires have been directed toward securing information along three general lines, viz.:

1. The influence of the pneumatic tire upon rolling resistance.
2. The protection from shock, caused by contact with an obstruction on or an unevenness of the road surface.
3. The relationships between the soil and the wheel as influenced by the pneumatic tire.

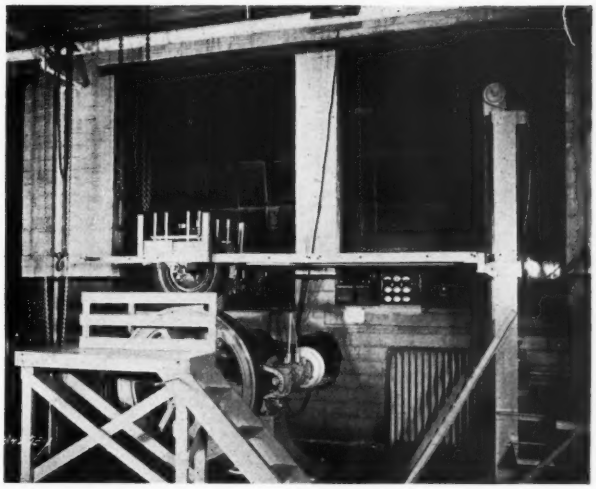
Although it is impossible to appraise with exactness the value of the various advantages and benefits which may be secured from the use of pneumatic tires, this paper will set forth some of the principles which may be used in their appraisal and also point out for comparison the customary items comprising the cost of using pneumatic tires.

Attention is called to the nine previous papers which have appeared monthly in *Agricultural Engineering*, beginning with November, 1939, and continuing to date under the general title, "Transport Wheels for Agricultural Machines."

Rolling Resistance

In the experiments previously described, the rolling resistance was measured for six steel and seventeen pneumatic-tired wheels, each with three loads and under four road and field conditions. Numerous additional tests were made to determine the influence of specific conditions of road surface or wheel arrangement on rolling resistance.

It was observed that while pneumatic tires actually increased the rolling resistance slightly over that for load carrying steel wheels at slow speeds on a smooth concrete surface, they reduced the rolling resistance as much as 46% on a tilled field. It is easily recognized that, for all practical purposes, the cost of moving a load over any road surface is proportional to the rolling resistance. With rather full knowledge of any situation relative to the cost of tractive power and road or field surfaces, it is possible to estimate the saving in transportation cost due to reduced rolling resistance. To illustrate, assume a situation where the cost of drawbar horsepower is 10¢ per hour, where the speed is 3 m.p.h. (miles per hour) and the drawbar pull is 125 pounds per horsepower. If a load of one ton is to be moved over a tilled surface, the data available indicates that the rolling resistance is 450 pounds when carried on a 6x28-inch steel wheel and 322 pounds when carried on a 6.00-16-inch pneumatic tire inflated to 20 pounds air pressure.[4] The power required to move the load on steel wheels under the condition specified would be 3.6 db.hp. (drawbar horsepower); while on the pneumatic tire the power would be 2.6 db.hp., or a saving of 1 db.hp. This would indicate that for every hour the machine in question is used under these conditions, the saving in power alone would be 10¢ per hour.



Apparatus for Measuring the Force of Impact Due to a Transport Wheel Striking an Obstruction on the Road Surface. The Apparatus Proved to Be Very Effective in Demonstrating the Protection from Shock to a Machine Afforded by a Pneumatic Tire

The annual saving, which may be used to determine a sound economic investment, would be determined by multiplying the hourly saving by the annual use of the machine in hours. This saving for 100 hours would be $10.

Similar estimates for the saving per hour due to reduced rolling resistance can be made for other situations. It should be fully emphasized that the saving thus estimated, due to lower rolling resistance, is for one condition only, and for any other condition, although susceptible to estimate, it would be different.

Protection from Shock

One of the principal advantages in the use of pneumatic tires is the protection afforded to the machine from shock due to impact with obstructions or unevenness of the road surface. The cushioning effect provided by the pneumatic tire makes for longer life or greater durability of the machine, because of less breakage and less wear on the working parts, and for greater comfort to the operator. In order to gain some knowledge concerning the nature of the protection from shock, special apparatus was constructed in the laboratory for measuring the shock from obstructions of known height and at different speeds. The apparatus consisted essentially of a drum which could be driven by an electric motor at a surface speed of approximately 2½, 5, 7½, 10, 15, and 20 m.p.h. A carriage or frame in which a wheel could be mounted and hinged at one end was so placed that the wheel under test came directly over the drum and was permitted to roll freely on the drum as it was driven at the various surface speeds. The wheel was loaded by weights so distributed that their

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[1] Reprinted from *Agricultural Engineering* for August, 1940, (Vol. 21, No. 8), the Journal of the American Society of Agricultural Engineers. This article is the tenth of a series of articles by the authors under the general title "Transport Wheels for Agricultural Machines."

[2] Fellow (Charter) A.S.A.E.

[3] Fellow A.S.A.E.

[4] See Table IV, *Agri. Eng.*, Dec., 1939, p. 472.

center of mass came directly over the axle. Provision was made for mounting obstructions on the drum varying from ½ inch to 2 inches in height by ½-inch increments. The effect of the impact of the wheel with an obstruction when rolling over the drum was measured by a six-element solenoid type accelerometer.[5] This instrument which has been described briefly in the first paper of this series,[6] measured the acceleration from which the force of impact was calculated. Some of the observations are given in Table 1.[7]

TABLE 1. IMPACT REACTIONS OF A STEEL WHEEL AND A PNEUMATIC-TIRED WHEEL OVER OBSTRUCTIONS[7]

Wheel	Speed, M.P.H.	Height of Obstruction, In.	Acceleration, Ft.-Sec.[2]	Impact, Lb.	Remarks
Steel wheel, 24-in. diam. 4-in. rim	2.5	½	200	6,030	
	5.1	½	495	14,900	Wheel deformed by impact
Pneumatic tire, 6.00-16, 20-lb. inflation	2.5	½	none	....	
	10	½	none	....	
	21.7	½	none	....	Slight vibration
	21.7	1	12	372	Slight vibration
	21.7	1½	41	1,273	Slight vibration
	21.7	2	48	1,490	Slight vibration

Watching the impact experiments with the apparatus described was much more impressive than the tabulated data. A loaded steel wheel rolling over a half-inch obstruction at five miles per hour was subject to a terrific blow accompanied by a loud report. A six-inch pneumatic tire carrying the same load, on the other hand, was apparently little affected by a half-inch obstruction, and even when the height of obstruction was increased to two inches and the speed increased to twenty miles per hour, the conditions were apparently not impractical for operation.

The protection from shock due to impact was further studied by road tests of two identical machines, one on steel wheels and one on pneumatic tires. The results of these tests were reported in the first paper[6] of the series.

Although it is impossible to fully appraise the value of the protection to a machine afforded by pneumatic tires, it is fairly easy to draw some definite conclusions from the observations which have been made. These may be summarized as follows:

1. The use of pneumatic tires on farm machines is imperative if field and road speeds are to be higher than 2½ to 3 m.p.h., the speeds established for horse-drawn machines.

2. The life of a farm machine should be lengthened even at normal horse-drawn field machine speeds, but the scope of the experiments here reported do not indicate how much.

3. The added comfort of operating a pneumatic-tired machine on which the operator rides over a machine with rigid wheels is easily demonstrated, but not susceptible of exact evaluation.

Soil Relationships

The results of the experiments for determining the relative effects of steel and pneumatic-tired wheels on the soil have been reported in a special paper.[8] These experiments indicated the following:

1. The pneumatic tire damaged temporary field roads much less than steel wheels, especially when a low inflation pressure was used.

2. Only about one-fifth as much soil adhered to the pneumatic tire during operation on wet sticky soil.

3. The pneumatic tire lifts much less dust to sift into the wind than the usual steel wheel.

These advantages, not easily appraised, should be taken into account when considering the advisability of pneumatic tires for any machine.

Cost of Pneumatic Tires

As is frequently the case in considering the advisability of an investment in equipment the advantages and savings must be weighed against the cost of use of the equipment. The problem ranges all the way from the situation where there is no question in regard to the advisability of an investment to another situation where an investment is clearly inadvisable. In the case of pneumatic tires for a vehicle or machine which is to be operated at high speed and subject to serious shocks, there can be no question but what pneumatic tires are not only economical but necessary. On the other hand a machine operated at slow speeds on favorable surfaces for a few days per year may not present a favorable situation for such an investment.

A number of factors influence the various items that make up the cost of using pneumatic tires as is the case with other equipment. These factors or individual items are usually listed as follows: first cost, depreciation, interest, taxes and insurance, and maintenance.

It is not definitely known how long tires for farm machines may be expected to last, but it may be presumed that they would last as long or longer than tractor tires whose life was recently set at an average of seven years.[9] Most observers contend that since the service expected of pneumatic tires on farm machines is not severe, the life is more or less independent of the use in days per year. Using the available information, it may be estimated that the cost of a pneumatic tire in terms of per cent. of first cost is as follows:

TABLE 2. ANNUAL COST OF TIRES IN % OF FIRST COST

	Life			
	6-Yr.	7-Yr.	8-Yr.	10-Yr.
Interest of 6% and depreciation*.....	19.2	16.9	15.2	12.8
Storage, insurance, and taxes.....	1.1	1.1	1.1	1.1
Maintenance repairs	2.0	2.0	2.0	2.0
Total annual cost, %	22.3	20.0	18.3	15.9

*See any table of condition per cent. for compound interest and sinking fund.

If the foregoing premise that the life of a tire is independent of annual use is correct, and observations seem to support this view, then the most important factor in reducing the cost of pneumatic tires is increased annual use. For instance, if the annual cost of a tire is $2.50 and the use is five days per year, the cost per day would be 50¢. But on the other hand, if the use were 50 days, the cost per day would be only 5¢ per day.

A significant feature of farm machines compared with factory equipment, for example, is the limited use per year. Table 3 from data recently compiled in Iowa gives the average annual use of the more common farm machines; for a purpose explained later in the discussion, a nominal weight of each machine is added.

Interchangeable Tires

The data in Table 3 are used to point out how many of the more common farm machines have a very limited use in days per year and how desirable it may be to have interchangeable tire equipment as far as possible. The machines used more than ten days are only six, viz.: tractor plow, cultivator, combine, corn picker, manure

[5] Accelerometer supplied through the courtesy of the Firestone Tire & Rubber Co.
[6] "Transport Wheels for Agricultural Machines." *Agri. Eng.*, Nov., 1939, p. 420.
[7] The impact apparatus was designed, built, and operated by P. J. Patel, formerly a graduate student, now with the University of Bombay, India. The research is reported in an unpublished thesis, "Impact Characteristics of Transport Wheels for Agricultural Machines," Iowa State College, 1939.
[8] *Agri. Eng.*, May, 1940, pp. 183-85.
[9] "Life, Service, and Cost of Service of Pneumatic Tractor Tires." Bul. 382. Iowa Agr. Exp. Sta., Sept., 1939.

TABLE 3. USE, KIND OF POWER USED, AND WEIGHT OF THE MORE COMMON FARM MACHINES*

Machine	% Farmers Having Machine	% Tractor Drawn	Days Used per Year	Size	Weight Lb.†	No. of Wheels	Distribution of Weight
Gang plow	29.5	0.0	8.2	2-12	900	3	⅓ each
Tractor plow	87.0	100.0	15.6	2-14	900	3	⅓ each
Broadcast seeder	78.5	48.0	3.4	11-ft.	700	2	½ 2 or mounted on wagon
Grain drill	26.3	45.7	5.6	14-7	1,800	2	½ each
Corn planter	98.3	8.9	6.0	2R	750	2	½ each
1-row cultivator	71.0	0.0	9.9	1R	700	2	½ each
2-row cultivator	28.8	0.0	11.8	2R	1,200	2	½ each
Mower	97.0	1.7	8.8	6-ft.	1,000	2	½ each
Hayrake	50.0	1.5	5.1	12-ft.	700	2	½ each
Side-delivery rake	64.5	11.2	6.6	12-ft.	1,100	3	⅓ each
Hay loader	62.0	25.4	8.0		1,500	4	2, - ⅜; 2, - ⅜
Grain binder	79.5	56.6	4.9	8-ft.	2,200	2	1, - ¼; 1, - ¼
Corn binder	40.0	33.5	5.2	1R	1,900	2	1, - ¼; 1, - ¼
Combine	15.5	100.0	21.8	5-ft.	3,000	2	2, - ½ each
Corn picker	31.0	99.2	14.3	2R	3,500	2	2, - ½ each
Manure spreader	94.0	8.5	27.7	with load	4,800	4	2, - ⅜; 2, - ⅜
Wagon	87.0	6.0	37.4	with load	5,000	4	4, - ¼ each
Trailer, 2-wheel	21.0	....	8.8			2	2, - ½ each
Trailer, 4-wheel	22.0	....	8.8			4	4, - ¼ each

* Unpublished data from recent investigation in Iowa. S. M. Henderson, Iowa Agr. Exp. Sta. 1940.
† Includes approximate weight of machine in common use plus operator and load.

spreader, and wagon, and the use of the first four are seasonable. The advantages that would accrue from practicable interchangeability is obvious from an inspection of the annual use.

Standardization of Sizes

Owing to the fact that farm machines, for the most part, were designed without any influence from the size of pneumatic tire which might be used, a large number of tire sizes have been offered to meet the wide range of existing farm-machine wheel sizes. Manufacturers realize that this large number of sizes means greater expense for manufacture due to cost of molds, stocks required, and other similar expense. They have through cooperative effort reduced the number of certified sizes from 118 to 73 and are working toward still further simplification. An ideal situation would be where less than a dozen tire sizes could be made to meet all requirements.

It should be pointed out that tires may be used either in a dual or tandem arrangement, and the cost of the two smaller tires may be less than that of a single of equal capacity. A four-ply, 6.00-16-inch pneumatic tire which has a load-carrying capacity, when used on an agricultural machine at 28 pounds inflation pressure, of 1,240 pounds, could presumably meet the requirement of 41 of 49 wheels listed in Table 3, and six additional conditions when used as duals or tandems. To use this size, however, many machines would need to be redesigned. It may be pointed out, in support of the suggestion that developments should be in this direction, that in the year 1939, 48% of the tires sold for farm implements were of the 5.00-16, 6.00-16, 6.50-16, and 7.00-16 sizes.[10] It should be recognized that a number of the latter two sizes were six-ply which have a greater load carrying capacity than the more common four-ply tire.

Use of Automobile Tires

There would be an important economic advantage in using tire sizes on farm machines or trucks. Not only should the price of such sizes be favorable, but the ease of securing them a matter of convenience. Owing to the fact that the service of tires on farm machines operating at slower speeds is less severe than on an automobile at high speed, and the safety hazard of using such tires for a longer period is less, there is much economic encouragement to transfer automobile tires to farm machines for further use at 15 to 25% of first cost. There seem to be valid reasons why such a practice should be encouraged.

Viewing the problem of equipping agricultural machines with pneumatic tires in its broader aspects, it seems that a careful weighing of the information available would support the proposition that, *if the economic and design problems of interchangeability and standardization are properly met, all tractor-drawn field machines should and probably will, with few exceptions, be carried on pneumatic tires within a comparatively short time.*

[10] *Farm Implement News*, June 13, 1940.

Rubber Slabs

(*Continued from page* 40)

a rigid structural part, thereby eliminating the need of riveted stiffening members. Production time and handling of small detail parts, sub-assembly time, shop routing, and inspection are reduced through the elimination of riveted stiffening members. Because of this, and because of the speed with which parts are produced, a given number of pieces requires considerably less factory space than was formerly needed.

The use of a single die and simpler tooling methods lowers costs. Cutting blocks are usually $\frac{5}{16}$-inch thick templates. Form blocks need not be of metal unless hot forming or strictly high production is required. Wood substitutes such as Masonite and Pregwood are satisfactory and may be fabricated into tooling with inexpensive wood-working equipment. Metal blocks, when necessary, can be torched from steel, sawed from aluminum or magnesium alloy plate, or fabricated from cast metal such as zinc, Kirksite, and scrap aluminum or magnesium. Simplicity of tooling often makes possible compounding of parts, reducing the number of detail parts needed.

Local distortion is eliminated and cold working reduced to a minimum because of the uniform pressure applied to the metal sheet by the rubber pad. Parts therefore undergo little or no distortion upon heat treatment. Parts being pressed out have no scratches or burrs on the side brought in contact with the rubber slab, eliminating the necessity of burnishing or buffing operations.

Developed for aircraft use, the Guerin process is particularly suited to the cutting and forming of aluminum and magnesium alloys. However it is adaptable to the lighter gages of stainless steel and will form fairly heavy mild or body steel. In addition to aircraft work, the process is also applicable to the manufacture of a wide variety of commercial products such as furniture, cabinets, and embossed articles.

The Guerin process of cutting and forming sheet material has been in use at the Douglas plant for several years.

EDITORIALS

Industry's Part in the Impending Readjustments

THE United States is not at war and does not expect to be embroiled in war. We are, however, entering an unpredictable period during which economic and industrial conditions will, to a large extent, resemble those encountered during and after the World War, the effect of which has been pronounced and extensive.

Billions of dollars are being spent for preparedness in the production of destructible and maintenance materials, in the expansion of plant capacity, and in the accumulation of essential materials, the supply of which may become inadequate under certain possible conditions. Men will be required for military training and associated purposes. Many of them must leave employment where, because of their experience and training, they have efficiently performed an essential function.

After the departure of these men, readjustment in the personnel must be made, and in many instances progressive training of new men will be necessary to fill the gaps. Even though temporary, the disturbing of smooth running organizations will result in some impairment in effectiveness. We are passing into a period when a program of industrial training of employes will be essential to insure the versatility requisite to minimum confusion during these organizational changes.

When those who will have received a year's military training return to seek their old or equivalent employment and others are needed for training, another period of readjustment will follow. Finally, when this need of expanded military protection has passed, there will be an excess of man power, and because of the cessation at that time of the production of materials and equipment of a military nature increased unemployment will result.

Heavier taxes are immediately facing us as these armament expenditures should be provided currently. Our national financial status is far different now than when we last took drastic preparedness measures a little more than twenty years ago. Then our federal indebtedness was comparatively small, and large borrowing did not jeopardize our economic structure. Today that same margin of safety does not exist; consequently we need to follow a pay-as-you-go policy.

There are many followers of the belief that industrial and commercial enterprise will, to a large extent, provide the means for these expenditures. If this practice is followed, the cost will necessarily come out of the sales income which, incidentally, represents the consumers' contribution for the goods purchased. Even in the face of this more difficult position now impending over business organizations, it is essential that provision be made for the accumulation of financial reserves as a means of alleviating the ill effects of the readjustment period, which, according to past experience, may be expected to follow a period of artificial stimulation. Otherwise, another and even more grave depression will be inevitable.

Appreciable expansion of industrial activities, through the improvement of measures for national defense, is now a certainty. Aside from its function of supplying the necessary materials, industry must prepare in advance for the accompanying readjustments so that the disruption of our national life may be held at a minimum.

Fire Prevention Week

THE period extending from October sixth to twelfth inclusive is to be observed as Fire Prevention Week, the purpose of which is to emphasize the hazards of fire and the necessity of preparing not only to minimize the number of fires by eliminating possible causes, but also to extinguish promptly those which may occur.

In many instances, where extraordinary fire hazards do not accompany the processes, carelessness is the greatest contributing factor to this means of destruction. In industry "poor housekeeping" and a failure to remove inflammable materials to their proper and designated locations are the most flagrant violations.

While prevention is the prime objective of everyone in the field of fire safety, millions of fires continue to break out every year regardless of the efforts being exerted. Hence everyone should be informed and equipped to cope with them when they do occur. A small fire can be extinguished readily if the proper means are at hand and if all persons are informed as to the proper methods, but if it is allowed to spread, life and a great amount of valuable property may be destroyed before the fire can be brought under control. Therefore every building in which a serious fire is possible should be protected with some means of extinguishing small fires quickly. Hand fire extinguishers of dependable type should be so strategically located as to be readily accessible and always near exits so that, if necessary, the user can get out safely.

When fighting fires in ordinary combustible materials, the stream from the extinguisher should be directed at the base of the flame so that the burning materials will be cooled and quenched. If an inflammable liquid is burning, the stream from the proper type of extinguisher should be played so as to confine the flame or drive it from the person or material to be protected.

Fire Prevention Week should serve to stimulate inspection of the plant and the fire fighting equipment as well as renewed instruction to all employes in the proper methods of preventing and extinguishing fires.

S. C. Stillwagon

EDITOR

What the Rubber Chemists Are Doing

Annual Meeting of the Rubber Division Has Large Attendance

THE Division of Rubber Chemistry, American Chemical Society, held its annual meeting in Detroit on September 12 and 13 in conjunction with the one hundredth meeting of the Society, which attracted an unusually large attendance, 4,206 members and guests being registered from September 9 to 14. All technical sessions for the many Divisions of the Society and some of the social activities were conducted in the spacious and well suited Masonic Temple. Local arrangements for the Society's convention were ably handled by the Detroit Section and the Detroit Rubber Group.

Dr. Charles F. Kettering, honorary chairman of the one hundredth meeting, was the principal speaker at the Subscription Banquet of the entire society held on Wednesday evening, September 11, in the Fountain Room of the Masonic Temple. Among the many pertinent points made by Dr. Kettering of particular interest to technical men was his statement, "For the first time in the history of nations, our nation is troubled with excesses—excesses of men, money and materials. These excesses are not because of too much technocracy, but rather too little technocracy."

Among the many inspection trips planned for the A.C.S. members of particular interest to the rubber men, were those to United States Rubber Co., Chrysler Corp., Engineering Laboratories; Ford Motor Co.; Plymouth Division, Chrysler Corp.; and Packard Motor Car Co.

Rubber Division Technical Sessions

The symposium on Rubber, Synthetics, and Plastics in the Automotive Industry as viewed by the Engineer and Chemist held on Thursday morning and the regular technical sessions of the Division of Rubber Chemistry were unusually well attended; some sessions had as many as 550 present, including representatives from the Automotive and Petroleum Industries. This symposium was planned by the Detroit Rubber Group.

In the September issue of INDIA RUBBER WORLD the abstracts, then available, of 17 of the 21 papers on the program were published. In this October issue, there appears on pages 43 and 44 an abstract of the paper on "Butyl Rubber, a New Hydrocarbon Product," by R. M. Thomas, I. E. Lightbown, W. J. Sparks, Per K. Frolich, and E. V. Murphree. This paper was first presented before the General Meeting of the Society on Monday and was repeated before the Division of Rubber Chemistry on Thursday. This paper, presented by Per K. Frolich, was supplemented and illustrated by a well-arranged motion picture, followed by an interesting discussion.

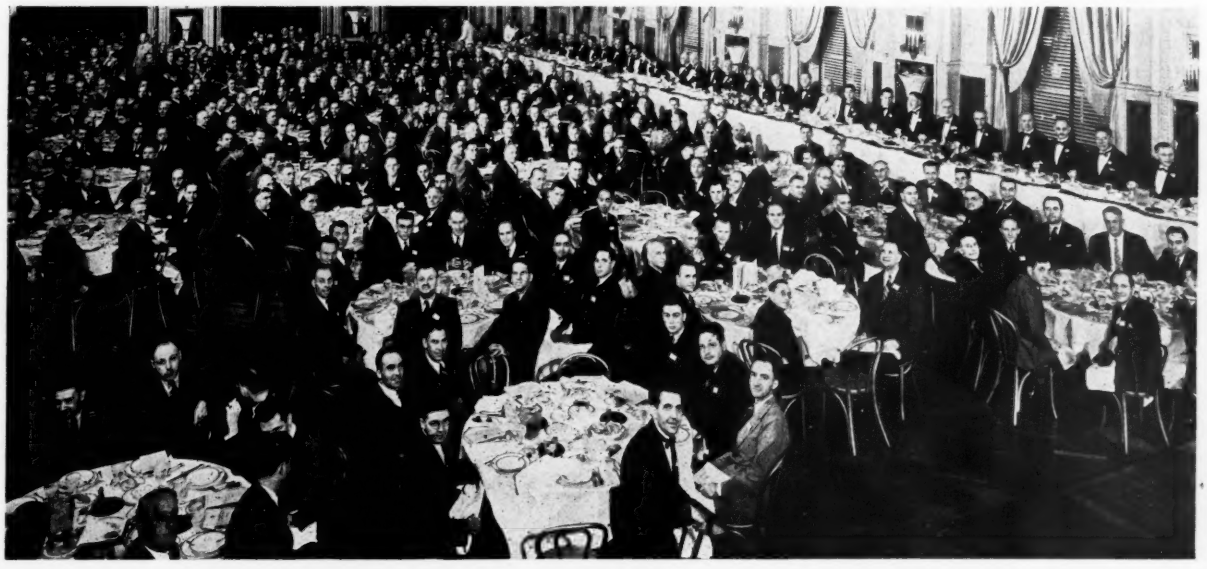
The three papers, in the symposium, of which no abstracts were prepared by the authors are: "The Standardization and Coordination of Automotive Rubber Parts Specifications," by L. A. Danse, of the Cadillac Motors Division, General Motors Corp.; "The Use of Plastics in the Automotive Industry," by W. M. Phillips, of General Motors Research Laboratories, and "The Use of Synthetic Rubber in the Automotive Industry from the Viewpoint of the Rubber Technologist," by J. N. Street, of the Firestone Tire & Rubber Co.

Mr. Danse reviewed the history of the need and the development of specifications for rubber parts used by the automotive industry and then reported on the accomplishments of Technical Committee A, jointly representing the A.S.T.M. and the S.A.E., which held its most recent meeting at Detroit on September 11. Mr. Phillips exhibited a very extensive and well arranged display of articles made from various plastics which, he said, could be classified into 16 groups. He discussed the characteristics and applications of plastics particularly as related to Automotive use.

Dr. Street reviewed the general characteristics of the rubber-like synthetics available today and considered in more detail the physical properties of neoprene, Perbunan, Buna S, and "Thiokol" as compared with natural rubber. Among the properties on which data were obtained were tensile strength, aging, compression set, and swelling in high-test gasoline, benzol, SAE-30 oil, and water. He also discussed flex cracking resistance, adhesion to metal, and heat resistance. Tire test results were mentioned which showed Buna S and neoprene to give wear equal to the best rubber treads. While Perbunan was said to be somewhat better, its use involves processing difficulties.

Crude Rubber Report

George A. Sackett, chairman of the Crude Rubber Committee, reported progress in the work of designing standard tests for plasticity determination and development of a stock for studying variation of age resistance. Methods of determining the mechanical stability of latex and for examining the



Rubber Division Banquet at One Hundredth A. C. S. Meeting in Detroit, September 12

cleanliness of crude rubber samples were presented.

The tentative test for latex stability is based on stirring a latex sample of specified volume under standard conditions of speed and temperature until coagulation results as determined by passing the latex through an 80-mesh screen. Alternatively, an experienced operator using latex which is known to react suitably, may determine the end-point visually.

The test for cleanliness consists of placing a small sample of the rubber in a specified amount of equal parts of paracymene and benzol, and filtering the cement formed through a standard screen, weighing the residue obtained. The test is not parallel to or a substitute for the factory test previously given, but for small sample investigation.

Business Meeting

At the business meeting of the Division of Rubber Chemistry officers for the ensuing year were elected as follows: vice chairman, J. N. Street; secretary, H. I. Cramer; treasurer, C. W. Christensen; sergeant-at-arms, C. P. Hall; directors, O. M. Hayden, Bruce Silver, and F. S. Malm. R. H. Gerke, vice chairman for the past year, automatically succeeds E. B. Curtis as chairman of the Division.

The Goodyear Lecture Committee reported that several candidates were considered at a recent meeting, but no selection has yet been made. The committee on nomenclature proposed that its rather lengthy report be published in *Rubber Chemistry and Technology*, and a motion to that effect was adopted. The Membership Committee reported that 60 new members had been obtained since the 1940 spring meeting and that the membership of the Division was now more than 700.

H. I. Cramer read the report of the Elections Committee, of which W. F. Busse is chairman. As a result of the recommendations a vote was taken to revise the by-laws of the Division as follows:

(1) Section 6 to be cancelled and replaced by the following:

Section 6:

ELECTIONS. All elections shall be by secret ballot.

The Nominating Committee shall report at the Spring Meeting following which report the Chairman shall invite nominations from the floor.

A printed ballot, carrying the names of the nominees for each office arranged in alphabetical order, shall be mailed to each Member by the Secretary, at least 30 days before the Annual Meeting. The ballots shall be opened and counted at the time of the Annual Meeting of the Society by a Tellers Committee appointed by the Chairman.

The Chairman shall not be eligible for election for the ensuing year. Three of the five Directors shall be elected by The Division for a term of one year, starting at the close of the Annual Meeting at which the election is held. The outgoing Chairman and the defeated nominee for Vice Chairman receiving next to the largest number of votes for that office shall be directors for the ensuing year. No Director shall be eligible for re-election as a Director for the ensuing year. Each Member shall vote for not more than three (3) nominees for Director. The three nominees for Director receiving the largest number of votes shall be declared elected. In the event of an undecisive vote because of a tie, those nominees receiving the same number of votes shall be voted on by the Members present at the Annual Meeting until the tie is removed. In the event that there is no Annual Meeting the tie shall be removed by the vote of the outgoing Executive Committee. Officers shall take office at the close of the Meeting at which they are elected and shall serve for one year, or until their successors are elected.

Section 9, MEETING, second paragraph to read:

Fifty (50) Members shall constitute a quorum for any Business Meeting of The Division.

Section 10, APPOINTED COMMITTEES, (A) Nominating Committee shall be changed to read:

A Nominating Committee of five (5) Members shall be appointed not later than March 1st of each year. This Committee shall select at least one (1) nominee for each office to be voted upon at the annual meeting and at least two (2) nominees for vice chairman.

The Papers Committee consisting of A. R. Kemp, C. C. Davis, and H. I. Cramer reported that the Executive Committee had adopted the following rules as relating to the submission and publication of papers to be presented before the Division.

I. *Submission:* Each author intending to present a paper before the Division of Rubber Chemistry shall submit to the Secretary by the usual deadline set by the Society (approximately 8 weeks before the beginning of each semi-annual convention) the title of his paper; three copies of an abstract of 200 to 250 words, an estimate of the time which will be needed for presentation, and the name of the laboratory in which the work was done.

II. *Approval:* Each paper shall be approved by a Papers Committee, consisting of the Editor of *Rubber Chemistry and Technology*, the Secretary, and a Member of the Division appointed by the Chairman, befor it is placed on the final program.

III. *Publication:*

1. Three copies of the complete manuscripts of all papers accepted for presentation before the Division shall be submitted to the Secretary on or prior to date of presentation.
2. The author of the paper shall designate the journal to which the manuscript shall be submitted. Publication of the paper shall follow one of four procedures:
   a. Original publication, when the paper is of interest and value to non-rubber chemists, in one of three Society journals: *Industrial & Engineering Chemistry*, *Journal of the American Chemical Society*, or *Journal of Physical Chemistry*, depending on the purport and contents of the paper.
   b. Original publication as in case (a), with the subsequent publication, by release of copyright, in *Rubber Chemistry and Technology*.
   c. Original publication in *Rubber Chemistry and Technology* when the paper is of interest and value chiefly to rubber chemists, and this is agreed to by the editor of the Society journal in which the paper might otherwise be published.
   d. Direct release subject to rules of American Chemical Society to an independent publication not under the editorial supervision of the Society.
3. The Secretary of the Division shall furnish the editor of the journal which has been chosen for publication with two copies of all manuscripts submitted. At the same time he shall transmit to the editor the names of two men, selected by the Papers Committee, to whom each manuscript may be sent for review prior to publication.

Rubber Division Banquet

The Rubber Division held its banquet in the ballroom of the Book-Cadillac Hotel on Thursday evening, with 630 members and guests in attendance. M. A. Clark, of the U. S. Rubber. Detroit plant, acted as toastmaster, and after a very excellent dinner and interspersed entertainment, W. J. Cameron, of Ford Motor, was introduced as the speaker of the evening. The entertainment was made possible by the generous donations of the following concerns: Advance Solvents & Chemical Corp., American Cyanamid & Chemical Corp., American Zinc Sales Co., Anaconda Zinc Oxide Dept., Baldwin Rubber Co., Binney & Smith Co., Carter Bell Mfg. Co., Central Rubber Corp., E. I. du Pont de Nemours & Co., Inc., Flintkote Co., General Atlas Carbon Co., General Tire & Rubber Co., C. P. Hall Co., Herron & Meyer, Inc., J. M. Huber, Inc., Industrial Rubber Corp., International Smelting & Refining Co., F. F. Meyers & Co., Midwest Rubber Reclaiming Co., Minnesota Mining & Mfg. Co., Monsanto Chemical Co., Moore & Munger, H. Muehlstein & Co., Inc., Naugatuck Chemical Div. of U. S. Rubber, New Jersey Zinc Sales Co., Pequanoc Rubber Co., Philadelphia Rubber Works Co., A. Schulman, Inc., Stamford Rubber Supply Co., Standard Chemical Co., St. Joseph Lead Co., Thiokol Corp., Titanium Pigment Corp., United Carbon Co., Inc., U. S. Rubber Reclaiming Co., Inc., R. T. Vanderbilt Co., C. K. Williams & Co., Wishnick-Tumpeer, Inc., Xylos Rubber Co., Columbia Alkali Corp., Continental Carbon Co.

Great credit for the success of the Rubber Division meeting is deserved by its officers and by the local committee of the Detroit Group, which was composed of W. G. Nelson, U. S. Rubber, Clarence Smart, Pontiac Motor Co., E.

(*Continued on page* 64)

New Machines and Appliances

Open Design Ro-Ball Screen for Wet Separations in the Rubber Industry

Separation Screens for the Rubber Industry

RO-BALL gyrating screens are used in the rubber industry for making separations on compounding ingredients and on cracked carcass stock and for the dewatering of rubber sludge after caustic treatment in reclaiming.

The sieve frame is divided into compartments, each of which contains three metal balls retained by a coarse mesh screen. The screen cloth or other screen material is placed over the balls. The movement of the machine causes the balls to rebound and thus produce an evenly distributed vibration over the entire screen surface. A gyrating action is produced by circular motion at the head end and reciprocal movement at the tail end. This gyrating action forces the fine material against the screen surface; while the metal ball cleaning device hastens the flow of the finer particles through the mesh openings and aids in keeping the screen clean. This ball cleaning device, by breaking down the surface friction between the water and the screen cloth, is especially helpful in dewatering rubber sludge. Any size of commercial screen cloth, metal, or silk can be used on this equipment.

A test service is available to determine the performance of Ro-Ball screens on samples of any type of material for separation. The J. H. Day Co., Cincinnati, O.

Twenty-Ton Molding Presses

TWO twenty-ton Standard molding presses for rubber and plastics have been introduced that are similar in design to the larger 50- to 300-ton Standard presses. One model is a self-contained, hydraulically operated unit with motor and pump in the base. The other is designed for air operation, at 125 pounds per square inch pressure, and therefore has no motor or pump. Like the larger presses, both of the smaller models have toggle action, which is said to promote quick action with an automatic slowing down of the movement as the platens come together. Control is through a single lever. F. J. Stokes Machine Co.

Press for Sponge or Blown Rubber Goods

THE press illustrated is designed for vulcanizing sponge or blown rubber goods such as inflated toys, small industrial tires, and toy wheel tires. The press is equipped with 40- by 40-inch steamjacketed and shielded platens. Operation is electric, not hydraulic, and control of the curing cycle is automatic. Time required for closing or opening is less than five seconds. On the closing stroke of the press the mold registers are brought together, metal to metal, for this type of work.

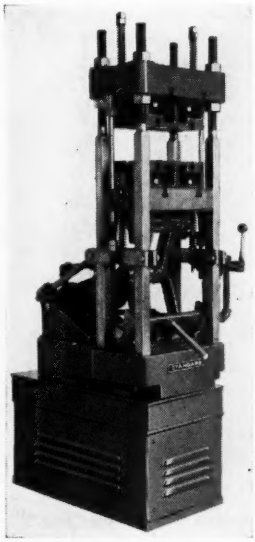
Blowing pressure is obtained from within, either by admitting air or steam pressure through a valve arrangement to the inside of the goods, or by means of gas pressure obtained from a "pill" insert. The press is equipped with an electrically operated safety bar which, if contacted during the closing stroke, brings the upper half of the press to an abrupt halt. The McNeil Machine & Engineering Co., Akron, O.

Checking Scale Features Portability

THE "General" scale is an over-and-under scale for checking and production purposes, featuring, it is claimed, greater capacity, convenient size, and portability. The scale is applicable for predetermined check-weighing in a range of from 40 to 150 pounds.

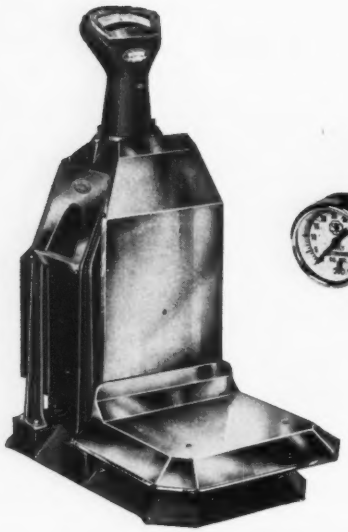
The scale is of the even balance type, with weighings made against full capacity, cast-iron, sealed weights. All castings, including the lever system, are of aluminum alloys. An air dashpot controls the oscillation of the indicator; while a short lever fall of only $\frac{1}{8}$-inch is said to reduce wear and abuse on bearings and pivots and to promote fast action. A weigh box with carrying handles, in which the weights are placed, is provided.

The scale is 33¼ inches long, 21 inches wide, and has an overall height of 46 inches, with the weighing platform only 6½ inches from the floor. For the convenience of the operator the tower in which the dial is housed may be turned in any direction. Unloaded,



Twenty-Ton Toggle-Operated Press

McNeil Press for Blown or Sponge Rubber



The "General" Checking Scale

the scale weighs 130 pounds. The Exact Weight Scale Co.

Expansion-Type Controller

THE "ESC" expansion steam temperature controller utilizes an 18-inch temperature-sensitive element, which extends from the back of the controller base, as the operating means. Control is solely through the expansion and contraction of this metallic element. The operation of the controller may be visually followed by two gages. A ¾-inch pipe union is used for mounting purposes. Seely Instrument Co., Akron, O.

Flexible Tube Connection

VIBRASEAL fittings consist of an adapter body, a neoprene gasket, and a locknut and are used as a flexible connection for copper, aluminum, and steel tubing. When assembled, a flexible seat is formed by the neoprene gasket, which permits the tubing to flex in a movement of several degrees, thus cushioning vibration at a vital point and eliminating the usual causes of tube breakage. There are four types of VibraSeal fittings, low pressure, high pressure, aircraft, and special purpose. VibraSeal Corp.

All-Purpose Eye Shield

THE Dependon safety shield for protecting eyes comprises a wide-view window of synthetic material which is attached to the headband by means of friction swivel joints that enable the wearer to raise the window entirely out of the way above his head. The headband is adjustable to fit any-size head; while the window is so far distant from the face as to permit complete ventilation and the wearing of glasses or goggles. The shield is recommended for: grinding and chipping operations; work

"ESC" Temperature Controller

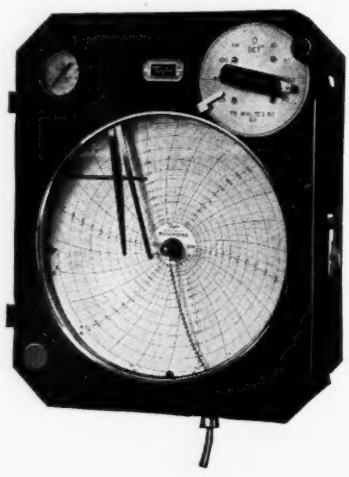
VibraSeal Fitting

Dependon Safety Shield

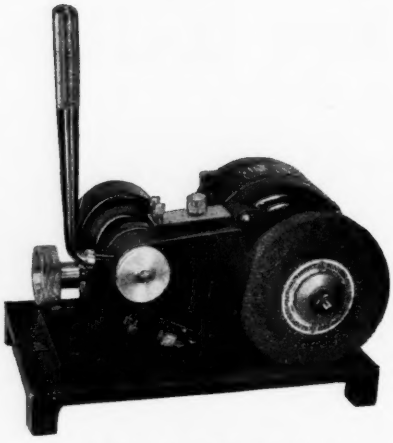
with acids, hot liquids, plating, degreasing, old paint, or scale; and for acetylene and spot welders. Sellstrom Mfg. Co.

Rubber Specimen Buffer

A BUFFER with an ingenious specimen holder evens the surface of rubber test specimens, removes fabric



Fulscope Controller Equipped with New Timing Mechanism



Grinder for Buffing Rubber Test Specimens

impressions, corrugations, etc., and reduces the thickness of specimens in preparation for specific tests. By means of a hand wheel (shown at the left in the illustration) the specimen can be advanced toward the grinding wheel in thousandths of an inch. To compensate for wear of the grinding wheel the specimen holder sector can be moved forward merely by loosening the four base bolts.

Quick-acting clamps hold the specimen firmly against a circular sector oscillated in front of the abrasive wheel which has a grain especially selected for this purpose. The grinding wheel, five inches in diameter, is mounted directly on the motor shaft. The motor runs at 3,400 r.p.m. and operates on a 115-volt a.c. circuit. Since all bearings and internal parts are fully enclosed, rubber and dirt particles cannot enter the mechanism. American Instrument Co.

Process Timing Mechanism for Fulscope Controllers

A NEW all-electric timing mechanism for Fulscope recording controllers is said to assure exact duration of processing, as well as precise temperature or pressure control, when applied to vulcanizers and similar equipment. In use, the instrument is adjusted manually for the desired time period. With the new mechanism the timing automatically starts, not immediately, but when the apparatus reaches the set point (pressure or temperature) of the controller. The length of time required for this set point to be reached makes no difference in the operation of the timing mechanism. At the end of the desired period the mechanism automatically terminates the process.

To facilitate the timing of successive cycles of the same duration, a "stop" is furnished on the timing mechanism dial. With this "stop" set at the desired timing period, the pointer can be quickly spun to the "stop," thus speeding up the starting operation. Taylor Instrument Cos., Rochester, N. Y.

New Goods and Specialties

Davis Mask

Wide-Vision Mask

A RESPIRATOR mask is made entirely of molded rubber, including face piece, connecting tube to canister, and head harness. Wide vision in all directions with the absence of obscuring light reflections is said to be obtained by specially shaped lenses, made of shatter-proof glass. Other claims for the mask are: close but comfortable fit, small dead air space to make for a minimum of rebreathing, and low resistance of exhalation valves to minimize fogging of lenses. Davis Emergency Equipment Co., Inc.

Extruded Electrical Tubing

AN EXTRUDED tubing of flexible plastic and made in continuous lengths is believed to be, according to the manufacturer, the first extruded tubing developed for electrical insulation in the United States. Irv-o-Lite Type XTE-30, as the tubing is known, is said to show improvement over varnished tubular cotton braids under many conditions and to be particularly suited for use in automotive, aviation, communications, and other fields where flexible tubing plays an important role in wire insulation.

Characteristics claimed for the tubing include: excellent flexibility at temperatures down to –4° F.; high resistance to tear and abrasion; high tensile strength (2,150 pounds per square inch for No. 8 tubing); heat and fire resistance; resistance to oils, coal tar solvents, denatured alcohol, gasoline, and acids and alkalis in concentrations up to 30% by weight; dielectric strength up to 0.022-inch wall thickness—dry, 750 volts per mil, and wet, 350 volts per mil. There are five standard colors, and sizes range from 0.034-inch (for No. 20 wire) to 0.625-inch, inside diameter. Irvington Varnish & Insulator Co.

50-Gallon Display Tank Installation of Mareng Cell, and a Cell of the Same Capacity Rolled to One-Foot Length and Four-Inches Diameter; At the Top Are Cells Which Withstood Bullet Fire

Self-Sealing Fuel Tank for War Planes

THE new Martin self-sealing fuel tank for airplanes is an outgrowth of the Martin Mareng cell, a synthetic rubber gasoline tank perfected in 1935. The old-type Mareng synthetic envelope, in addition to allowing greater fuel capacity and permitting easy replacement without tearing whole wing-sections apart, proved in war operations that it could retard the leakage of gasoline from bullet holes to permit airplanes to return to their bases. The new Martin tank, however, goes further and seals the holes instantly, permitting airplanes not only to return safely, but to continue action immediately.

The new Mareng cell is made of synthetic rubber about ¼-inch thick. While the composition of the synthetic material is held strictly secret, it is believed that the gasoline sets up a chemical reaction which aids in closing the punctures. The tank can be stuffed into the small openings of wing apertures, and, when filled with fuel, it expands into any shape permitted by the space available. Tests with bursts of machine gun fire were said to show that the tank is self-sealing under the impact of 30 and 50 calibre bullets. Glenn L. Martin Co.

Presto Stapler with Snap-On Rubber Base

Rubber-Legged Fish Lure

New Koroseal Apron Recently Introduced at the New York Housewares Show in Atlantic City by Warren Featherbone Co.

Stapler with Rubber Base

THE Presto Deluxe stapler is equipped with a snap-on molded rubber base that serves both as a cushioning pad and as a reserve magazine for holding 400 extra staples. As a cushion, the rubber base quiets the stapling operation and protects the desk surface. Metal Specialties Mfg. Co.

Fly Rod Lure

THE Hula Popper fly rod lure, recommended for bass, has rubber legs and a gaping mouth that makes a loud "burp" when the line is jerked. The rubber legs are said actually to curl up slowly while the bug is at rest on the water. Fred Arbogast.

Non-Slip Rubber Paint

CONCRETE and wooden floors are made non-slippery by applying Safe-T-Step, a rubber base paint combined with an abrasive. Applied by brush, the paint dries within four or five hours and may be walked on the next day. Truscon Laboratories, Inc.

UNITED STATES

Business Activity Remains at Good Level

Industrial output and heavy volume of new business continue at an even pace although the holiday early last month reduced schedules during the first week. Opinion, in general, is that business will improve for the balance of the year and early 1941 at least, though one expert sees only rising activity and lagging profits, the latter due to higher taxes for financing government expenditures. Many factors, of course, influence forecasts, including the coming presidential election, the fate of Britain, the expansion plans of Japan, the U. S. national defense program and "draft of industry."

Inventories are somehat larger, but it is apparent from the records that inventory accumulation has not played a major role in the recent expansion in manufacturing activity. Employment was down slightly, but is expected to increase this fall.

After the Labor Day week-end industry resumed its stride. Last month fluctuations occurred in carloadings, power output, and the cotton mill rate, all, however, ending in an upward trend. Tin operations declined to 41% of capacity. Gains were recorded for lumber, paper, oil, and steel output, with the latter at 93%, the high of the year. Machine tool output also is approaching record figures. Automobile production rose steadily on new car models. All plants last month went into full swing, and it is expected that production would be 65% higher than that of September, 1939, when, however, new models were introduced later than in 1940. Dealers whose companies have announced 1941 cars report fairly good reception.

The rubber industry is doing well and expects good business for the rest of 1940. Tire replacement shipments for the year to date are about the same as last year, but have dropped considerably in the past few months; this decline, though, is offset by gains for original equipment tires. Quite a demand exists also for truck and bus tires. Insulated wire continues at a good rate, and mechanicals are active, filling orders for the automotive industry.

Manufacturers' inventories of rubber products recently increased noticeably; expansion of raw material holdings accounted for more than one-half the increased inventories. The value of manufacturers' shipments, however, declined this summer.

A survey of profits of industrial organizations for the first half of 1940 revealed that the rubber industry earned more than 2½ million dollars less than in the first six months of 1939, and prospects for the second half of the current year also indicate restricted earnings.

EASTERN AND SOUTHERN

U. S. Rubber Develops Synthetic Rubber Clothing

United States Rubber Co., 1230 Sixth Ave., New York, N. Y., on September 20 announced the development of synthetic rubber clothing providing superior protection for certain industrial workers. Clothing includes coats, jackets, overalls, aprons, leggings, sleeves, hats, boots, and overshoes. Industries in which the apparel is expected to be most used are: petroleum, chemical, creamery and dairy, cannery, meat and poultry packing, hard rock mining, commercial fishing, tree spraying, and defense. Complete imperviousness for the garments was attained, it is said, through the invention by the company of a new "curing cement," with which all seams of the garments are vulcanized, thus eliminating stitch holes, a means of penetration.

These clothing items, which will be marketed under the trade name "Synthal," will cost at least twice as much as those made from natural rubber, but will compensate through a longer life.

Cyrus S. Ching, director of public relations, U. S. Rubber, last month was named to the Industrial Committee of the Merchants Association of New York. This committee deals with advisory supervision of the Industrial Bureau and jurisdiction over all matters relating to the industrial interest and development of New York, and relations between employers and employes.

I. B. Kleinert Rubber Co., 485 Fifth Ave., New York, N. Y., according to Vice President George K. Guinzburg, after an encouraging first play-shoe season, has decided to put its new shoe division on a permanent basis. The company last year experimented with a restricted group of play shoes which were so well received by the trade that Kleinert produced a very much expanded line for the past season. The firm's principal reason for entering this field is that for a great many years Kleinert has been identified with most types of beach and bathing accessories and felt its presentation would be more complete were shoes included.

CALENDAR

Oct. 7-11. National Safety Council. 29th Annual Safety Congress and Exposition. Stevens Hotel, Chicago.

Oct. 8. Los Angeles Rubber Group. Mayfair Hotel.

Oct. 12-19. National Automobile Show. Grand Central Palace, New York.

Oct. 17. Buffalo Rubber Group. Hotel Lenox.

Oct. 18. Chicago Rubber Group. Hotel Sherman.

Oct. 18. New York Rubber Group. Building Employers' Trade Assn., 2 Park Ave.

Oct. 18-19. Society of Rheology, New York Academy of Science, New York.

Oct. 24. Boston Rubber Group. University Club.

Oct. 24-25. Association of American Battery Manufacturers, Inc. 17th Annual Convention. Palmer House, Chicago.

Oct. 27-29. N.A.W.M.D. Fall Convention. Hollenden Hotel, Cleveland.

Nov. 8. Akron Rubber Group. Akron City Club.

Nov. 8-9. Industrial Management Society. 3rd National Time and Motion Study Clinic. Chicago Towers Club, Chicago.

Nov. 15. American Section, S.C.I. Program on Plastics.

Dec. 2-5. A.S.M.E. 61st Annual Meeting. Hotel Astor, New York.

Dec. 6. American Section, S.C.I., and New York Section, A.C.S. Joint meeting.

Dec. 2-7. 14th National Exposition of Power & Mechanical Engineering. Grand Central Palace, New York.

Dec. 30-Jan. 1. Division of Physical and Inorganic Chemistry, A.C.S. Symposium on Structure of Molecules and Aggregates of Molecules. Columbia University, New York.

Course on Rubber and Synthetics

A graduate course on "Rubber and Synthetic High Polymers" will be given at Polytechnic Institute of Brooklyn throughout the school year, 1940-1941, by Dr. H. Mark, authority on polymerization. Classes which are scheduled for Thursday evenings, 8 to 10, began on September 26.

American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y., has appointed Reginald M. Banks assistant to the president to promote the coordination of research and sales activities. Mr. Banks came to Cyanamid in 1928 from Nitrate Agencies Co., a subsidiary of W. R. Grace & Co. He recently was manager of the Organic Chemical Sales Department of American Cyanamid & Chemical Co., where he has been succeeded by Walter T. Mac Adam.

Pierce-Roberts Rubber Co. is operating with two shifts, and the **Puritan Rubber Co.,** both of Trenton, N. J., is working extra hours.

Supply Contracts Awarded

Included in the recent listings of United States supply contracts awarded are:

CAA: *cable,* Circle Wire & Cable Corp., Maspeth, L. I., $20,322.

Coast Guard: *cable,* Okonite Co., Passaic, N. J., $30,615.

Navy: *cable,* Circle Wire, $93,939.36, Collyer Insulated Wire Co., Pawtucket, R. I., $505,426.91, Crescent Insulated Wire & Cable Co., Trenton, N. J., $45,402, General Electric Co., Schenectady, N. Y., $77,697, Okonite, $78,224, Phelps Dodge Copper Products Corp., Habirshaw Cable & Wire Division, New York, N. Y., $66,030, Rockbestos Products Corp., New Haven, Conn., $77,812; *cotton canvas,* Wellington Sears Co., Inc., New York, $77,007; *erasers,* Eagle Pencil Co., New York, $17,014; *titanium,* Titanium Pigment Corp., New York, $86,220; *whiting and chalk,* Whittaker, Clark & Daniels, Inc., New York, $6,756; *zinc oxide,* New Jersey Zinc Sales Co., Inc., New York, $93,750.

Treasury: *cable,* GE, $25,108.

War: *bandages,* Johnson & Johnson, New Brunswick, N. J., $88,800; *dental supplies,* S. S. White Dental Mfg. Co., Philadelphia, Pa., $18,675; *molds,* Farrel-Birmingham Co., Inc., Ansonia, Conn.; *platens,* Farrel, $39,600; *tires,* Seiberling Rubber Co., Akron, O., $11,369; *valves,* Rubatex Products, Inc., Bedford, Va., $9,960.

John A. Roebling's Sons Co., Trenton, N. J., manufacturer of wire rope, electrical wires and cables, strip steel, and other wire specialties, has created a new export division at 19 Rector St., New York, N. Y., and named William P. Laseter as manager. Mr. Laseter, a native of Georgia, was graduated from the Georgia Military College shortly before this country's entrance into the World War. After receiving his commission at Fort McPherson (Atlanta), he was sent immediately overseas where he saw active service with the A. E. F. Since 1919 he has been identified with Latin-American trade, mostly in Cuba and Mexico. Mr. Laseter comes to Roebling from the Oil Well Supply Co. where he served as assistant manager of the export division as well as president of Cia. Consolidada "Oilwell", S. A., the Mexican subsidiary.

The Columbia Alkali Corp., chemical sales division of the Pittsburgh Plate Glass Co., Pittsburgh, Pa., has announced that Dr. G. L. Cunningham, since 1930 research chemist at Mathieson Alkali Works, Inc., Niagara Falls, N. Y., is now a member of the Columbia Alkali technical service department. Also, A. E. Daley has joined the sales staff as a representative on less than carload sales of Columbia products in the Chicago metropolitan area.

Luzerne Rubber Co., Trenton, N. J., and **Vulcanized Rubber Co.,** Morrisville, Pa., are busy on hard rubber products.

Manhattan Rubber Buys Brighton Mills Property

To provide needed additional space for storage and steadily expanding manufacturing facilities, Raybestos-Manhattan, Inc., has purchased the Brighton Mills plant adjacent to the main plant of The Manhattan Rubber Mfg. Division at Passaic, N. J., according to F. L. Curtis, general manager. The property includes approximately 5½ acres on which are buildings with 240,000 square feet of floor space.

The development of new rubber products and the wider use of rubber goods by several major industries has resulted in a steady growth of Manhattan's business, necessitating additional manufacturing and storage space.

Townsend Memorial

Employes of Manhattan Rubber, headed by Grannell E. Knox, the firm's New Jersey sales manager and general chairman of the Townsend Memorial Association, plan tribute to Col. Arthur F. Townsend, chairman of Raybestos-Manhattan, Inc., and general manager of the Manhattan division, who died January 14. The memorial, to be erected outside the Willett St. office occupied for many years by the late executive, will, in recognition of his patriotic and military activities, consist of a bronze flagstaff 54 feet high, set in granite. The bronze footing for the staff will feature rubber leaves, indicative of another phase of the colonel's life. The torus molding in the foot of the drum will be enlarged with ground laurel, state flower of Massachusetts where the deceased was born. A suitable sentiment will be inscribed on the granite base. The bas relief will show also a likeness of Colonel Townsend. An urn containing his ashes will go in a niche in the granite base, which will also hold a bronze box bearing names of contributors to the fund inscribed on parchment.

The memorial will not be finished for several months, and dedication ceremonies are scheduled for next spring.

Rubber, Our Most Valuable Import

According to the pamphlet, "Rubber: History, Production, and Manufacture,"[1] by P. W. Barker, issued by the Department of Commerce, "Rubber was the item of greatest value imported by the United States during the last five years, our annual rubber bill averaging more than $151,000,000, exceeding such important commodities as cane sugar, coffee, wood pulp, and raw silk. [U. S. rubber consumption in 1939 totaled 592,000 long tons, which, if figured at 18¢ per pound would cost $239,000,000. *Ed.*] About 500 American establishments are engaged in the manufacture of rubber products, and the industry gives employment directly to more than 150,000 persons who produce goods valued at over $1,000,000,000 annually at retail."

[1] Reviewed on p. 72 of this issue.

Premium Show

The Sixth Annual Atlantic Coast Premium Buyers' Exposition was held at the Hotel Astor, New York, N. Y., September 9 to 13 under the auspices of Premium Advertising Association of America, Inc., New York. At the show the Barr Rubber Products Co., Sandusky, O., displayed its rubber toys, featuring: patriotic and political balloons; play kit of balls, balloons, jackstones, etc.; and the "Noisy Rascal," a new novelty comprising two balloons, head and body, joined by a whistle which sounds upon squeezing the body portion. The Walter Kidde Sales Co., Bloomfield, N. J., introduced the Floto balloon. With each balloon there is a metal bulb filled with helium gas which is introduced, after the balloon is blown up with air, to provide lifting power.

The Greater New York Fund, 52 Wall St., New York, N. Y., has announced that $5,491 was raised by the Rubber Section of the Industry Division of the Greater New York Fund for this year's campaign. The final total was reported by Wm. E. Bruyn, treasurer and director of Littlejohn & Co., and chairman of the section, to F. B. Davis, Jr., president of the United States Rubber Co., and chairman of the Industry Division. Contributors included U. S. Rubber, Littlejohn, Charles T. Wilson Co., Inc., H. A. Astlett & Co., U. S. Rubber Reclaiming Co., Inc., Robert Badenhop Corp., H. Muehlstein & Co., Inc., Meyer & Brown Corp., Vulcanized Rubber Co., Baird Rubber & Trading Co., Inc., Hecht, Levis & Kahn, Inc., Paul Bertuch & Co., Inc., Continental Rubber Co. of New York, Avia Co., Nat E. Berzen, Inc., Jacobus F. Frank, Presto-Rub Mfg. Co., Inc., Swerling Trading Corp., Herron & Meyer, Fred Pusinelli & Co., Inc., M. Barbanell, Inc., Johnston Rubber Co., Raw Products Trading Corp., Farr & Co., Hermann Weber Co., F. Lester Kittle, Inc., Gustav Kush, Fred B. Peterson & Co., Inc., Paul Elbogen & Co., L. W. Dumont & Co., Majestic Packing & Rubber Corp., United Rubber Supply Co., S. V. S. Brewster.

General Cable Corp., Rome, N. Y., has announced that Donald Clash recently joined the rubber department of the General Research Laboratories at Rome. Mr. Clash previously had been with the Acorn Insulated Wire Co., Inc., Brooklyn, N. Y., since October, 1937, and for three preceding years had been with the research and development department of Anaconda Wire & Cable Co., Pawtucket, R. I.

Morrison Rubber Co., Trenton, N. J., is marketing a new line of coil braids and rings. The concern finds trade better for all its products.

Nearpara Rubber Co., Trenton, N. J., finds demand better for reclaimed rubber and is now running to capacity.

L. Albert & Son, rubber machinery dealer, reports running to capacity in its plants at Trenton, N. J., Akron, O., and Los Angeles, Calif.

A. G. Spalding & Bros., Inc., athletic outfitter, 19 Beekman St., New York, N. Y., recently named P. Lyndon Dodge to the board, succeeding Dean Mathey, resigned.

Whitehead Bros. Rubber Co., Trenton, N. J., is building a two-story addition to its office on Whitehead Rd., to cost $3,500. The company is operating normally.

Bell Telephone Laboratories, Inc., 463 West St., New York, N. Y., has announced that, effective October 1, Dr. O. E. Buckley, executive vice-president, was elected president to succeed Dr. Frank B. Jewett, who becomes chairman of the board.

Overton Machine Works, Trenton, N. J., busy making rubber molds, has hired extra help.

The Technical Committee of The Rubber Manufacturers' Association, Inc., New York, N. Y., held a dinner-meeting at the Trenton Country Club on August 26 and 27. L. J. Howell, of the Hamilton Rubber Mfg. Co., Trenton, was chairman of the event. Members also played golf.

Martin Custom Made Tires Corp., 47th St. and Eleventh Ave., New York, N. Y., now markets a New Green Super "Life Preserver" tube and the new Super De Luxe "Pneu-Color" Tire, which is available with black, white, red, blue, green, orange, or maroon sidewalls, with one side of the tire snow white, permitting its use as either a colored or white wall tire.

American Council of Commercial Laboratories, 1415 Park Ave., Hoboken, N. J., has named A. J. Nydick executive secretary. He is associated with Garey & Garey, Esqs., 63 Wall St., New York, N. Y., is representative in Pennsylvania for the American Chemical Society, and is general counsel for the Pennsylvania Chemical Society. The A.C.C.L., made up of testing and research laboratories throughout the country, was formed in 1937 to serve as a clearing house for the dissemination of scientific and testing research information to its various members and to serve as a control board in the maintenance of high-standard professional ethics in testing and research.

Lycoming Hosiery Mills, 385 Fifth Ave., New York, N. Y., according to President Samuel T. Burd, has introduced stockings with a reenforced nylon-covered elastic toe to take care of the added strain and wear caused by open-toe shoes. The new toe utilizes a very fine elastic thread strengthened by nylon covering and is knitted into the stocking. Used now only on silk hosiery, later it will also be available in nylon stockings and on all types of men's hose.

Intercontinental Rubber Co., New York, N. Y., in its recent semi-annual statement to stockholders, signed by President George H. Carnahan, stated that production of guayule rubber in Mexico has been increased. Two factories have been operated on a three-shift or 24-hour basis, and the third factory at Torreon, on a two-shift basis. The potential shrub supply is adequate to maintain the present rate of production; and the loss late last year of European sales of guayule rubber has thus far been fully compensated by increased sales in the United States. Taxes in Mexico tend to become an increasing burden, and the Mexican export tax is a serious addition to production cost. There has been no important change in the legal controversy over title to lands on the Cedros ranch, and the matter continues before the Supreme Court of Mexico where it has been for some years.

Crescent Insulated Wire & Cable Co., Trenton, N. J., busy with a number of large-size war orders, now operates with three shifts. On August 30 the firm lost $20,712 when four armed gunmen invaded the offices and walked off with the payroll.

The Conference Board, 247 Park Ave., New York, N. Y., through President Virgil Jordan has announced the appointment of Fairfield E. Raymond as administrative assistant. For nearly two years Mr. Raymond was director of the Joint Patent Inquiry sponsored by the National Association of Manufacturers, The Conference Board, and the American Engineering Council. Prior to that he was for ten years associate professor of industrial research at his Alma Mater, Massachusetts Institute of Technology, having special charge of studies relating to administrative technique.

Jos. Stokes Rubber Co., Trenton, N. J., has appointed as factory engineer, Carl Schell, formerly with The Thermoid Co., Trenton. The Stokes concern is operating to capacity, while the same conditions prevail at its Canadian plant.

Fineburg's, Inc., tire dealer, Trenton, N. J., is constructing a warehouse at a new location where three buildings have been razed to make way for the improvements.

Mercer Rubber Co., Hamilton Square, N. J., reports increased business. Office Superintendent Howard M. West, and Miss Emma Farrell recently were married. Vice President Fred R. Sayen was on a fishing trip along the Jersey coast.

Schofield-Donald Co., Inc., chemical concern, 154 Nassau St., New York, N. Y., on October 1 moved its executive offices and laboratory to 88 Shipman St., Newark, N. J. Warehouse facilities will be continued in New York.

The Thermoid Co., Trenton, N. J., is very busy at present. As a result of a vote in favor of a picnic or a day at the New York World's Fair, Essex employes and their families again were guests of the company at the Fair, September 14, to which the trip was made by a specially chartered train. More than 2,400 attended, and the company paid all expenses, including admissions and luncheons. One of the features of the trip was a camera contest, and cash awards were made.

Thermoid last month reported that its gross sales, including those of domestic subsidiaries, in August totaled $802,245, against $558,319 in the same month last year. For the first eight months of 1940 the figure was $5,586,600, against $3,910,767 in the corresponding period of 1939.

NEW ENGLAND

W. G. (Bill) Coe, previously production manager of *The Rubber Age*, New York, N. Y., has accepted a position, effective October 1, with the Fisk Tire Division, United States Rubber Co., in Chicopee Falls, Mass., where he has taken up his new duties in the product control department.

Stauffer Chemical Co., 420 Lexington Ave., New York, N. Y., has appointed Ralph B. Huber, 216 Tremont St., Boston, Mass., as sales representative in New England, to handle the firm's complete line of heavy chemicals including the Stauffer Tire Brand and Tube Brand Rubbermakers' Sulphurs, and Crystex (insoluble) Sulphur. Mr. Huber has been New England manufacturers agent for many leading companies since 1933. Prior to that he was affiliated with various rubber companies as chief chemist.

Rhode Island rubber manufacturers in August paid out to workers $247,185, a decrease of 9.3% below the payroll of July and 49% below August, 1939.

National Fire Prevention Association, 60 Batterymarch St., Boston, Mass., through General Manager Percy Bugbee has announced that this year the United States will observe Fire Prevention Week, October 6-12. It is estimated that in 1939 at least 10,000 lives were lost as a result of fires, many due to carelessness in the home. Property losses last year were estimated at $274,943,000, against $265,591,000 in 1938 and $254,959,000 in 1937.

Vultex Chemical Co., 666 Main St., Cambridge, Mass., has announced the engagement of Prof. Chester M. Alter, of Boston University, as chemical consultant. Dr. Alter, who received his Ph.D. from Harvard University, is devoting a part of his time to general research and development problems.

OHIO

Goodyear Announcements

The Goodyear Tire & Rubber Co., Akron, has equipped itself with a new fleet of four planes quartered in the Akron airport under the command of Clarence O. Bell, company pilot and sales engineer. The planes will be used for aviation research, the testing out of new development, and for other experimental purposes, as well as for sales work with plane manufacturers on tires, tubes, wheels, brakes, Airfoam and other products which are part of aircraft equipment.

With the Personnel

A. G. Cameron, vice president and general manager of the Goodyear Export Co., has announced the following three promotions. Frank T. Magennis, since 1936 vice president of Goodyear-Argentina, has been named, in addition to A. E. Patterson, assistant manager of the Export company, with headquarters in Akron, and is succeeded in Buenos Aires by David M. Hastings, manager of the Export merchandising department in Akron, which post now is held by Paul E. Gleichauf, formerly assistant manager.

A. B. Clunan, manager of Goodyear's Packaging Division, Pliofilm Dept., has been appointed to both the Packaging Council of the American Management Association and the Packaging Institute. Mr. Clunan becomes a member on the Institute's nominating committee, which will select a slate of directors representing the suppliers' division for the coming year. The committee will also take part in the Packaging Exposition to be held in Chicago in 1941 and is soon to have a council session to outline plans for that event.

The Packaging Council has long served the packaging industry as a recognized group of experts nominated annually by the Management Association.

Goodyear-Made Button in Alaska

Goodyear recently received a letter from the postmistress at Steel Creek, Alaska, stating she had found in the old post office there a rubber button, with a brass pin through the center and a small eye so that the button could be sewed on to a garment on the inside, which was marked "N. R. Co.—Goodyear p-t, 1851," presumably made by a company to which the inventor, Charles Goodyear, had licensed out one of his many patents.

300-Millionth Tire on View

On exhibition in Chicago's Museum of Science and Industry, Jackson Park, Ill., devoted to outstanding achievements in physics, automotive engineering, aviation, agriculture, textile, forestry, metallurgy, and medical science, is the giant 300-millionth tire built by Goodyear at Akron, August 9, 1939. Ten feet high, 34½ inches in cross-section, with 1½-inch tread, the tire is the first of its kind and similar to the six pneumatics used on the snow cruiser of the United States Government Antarctic Expedition. In service the tire and tube, weighing ½-ton, is inflated to contain 128 cubic feet of air, as compared with slightly less than one cubic foot in the conventional 6.00-16 tire for passenger cars.

Over 66,000 Miles of Jungle on Goodyear Tires

The Tenth Gatti Expedition to the Belgian Congo, South Central Africa, recently ended, and although Commander and Mrs. Gatti are home once more in the United States, their trailers and truck tractors are still at Matadi, on the African West Coast, awaiting shipment to this country, but held in Africa because of the war. As transport, Commander Gatti first used the camel, then various makes of European equipment, and finally on the Tenth Tour, International-Harvester-powered jungle yachts on Goodyear tires that successfully performed over 66,000 miles, which, according to Mr. Gatti were over such rough and uncouth territory that their equivalent in this country would be nearly 660,000 miles.

Trade Opportunities in South America

J. L. Cochrun, Jr., representative of The Seiberling Rubber Co., Akron, in South America, after some two years there, was home in Akron for a few weeks, after which he resumed his coverage of Central and South America. Mr. Cochrun, who likes South America very much, believes that the United States has a great opportunity to make lasting friends of the South American republics.

"We have a wonderful chance in South America—commercially and politically. Right now foreign competition is at a low ebb and the people want our goods. But something will have to be done about the foreign exchange problem—and quickly! Just take tire dealers. Lots of them have empty shelves, books full of orders, and no tires—just because they have pesos, but no dollars. And not only tire dealers. Just before I left, the head of an American film distribution company in Guayaquil, Ecuador, told me that within three days no more American films would be shown in that country. The reason? No more dollar exchange.

"This is a situation which we must do something about—or all our trade opportunities will collapse. The Germans were already promising deliveries by September 15 on a credit or barter basis, to our prospects in South American lands.

"And don't forget that Germany and her allies are very good customers of the South American lands. Many of these countries have only one product to export in quantity—coffee. And Germany takes about 40% of the total crop. That's too big a market to quarrel with. We buy very little from them, outside of coffee, and that's a market that won't expand much more, and their wheat and meat and other products are directly competitive with our own. Mostly our traders have approached South Americans on a 'take it or leave it' basis—and the South Americans have mostly 'left it' because European nations are more obliging in their dealings.

"Since I have returned many people have asked me what the possibilities are of military invasion of South America by a European power. If this ever does occur, I believe that it will not take place for a great length of time. We will first of all see an economic invasion which will be the first stepping stone to foreign dominance of South America. If this is successful, we might then see a military invasion."

Goodrich Activities

For guiding Chevrolet production to the 16-million mark, Marvin E. Coyle, general manager of the General Motors division, on September 18, received the Goodrich award for distinguished public service from John L. Collyer, president of The B. F. Goodrich Co., Akron, and was the guest of Col. David M. Goodrich, chairman of the rubber company, at a special daredevil demonstration of automotive stamina in the Akron firm's arena at the New York World's Fair.

Brake-Heat-Resistant Plane Tubes

By utilizing the experience gained from the use of the compounds in truck and bus tires and tubes, Goodrich tire engineers developed special heat-resisting rubber compounds in airplane tubes to lessen the hazard of heat in aircraft landings, and the company has adapted these new developments to its entire airplane line. These compounds, reports J. S. Pedler, manager of Goodrich's aeronautics sales, solve the problem of brake heat which arose with the trend toward larger planes landing at higher speeds with heavier loads. With commercial liners weighing up to 22½ tons and landing at speeds above 70 miles an hour, the tremendous load on the brakes results in high heat often ranging above 300° F. during the eight or nine seconds that the brakes are applied when a large transport plane lands.

New Car Heaters

The Goodrich automotive accessories division recently announced a complete new line of automobile heaters, featuring greater heating capacity and efficiency, and comprising four new hot-water heaters, including an "underseat" unit, and a new "Super defroster."

Diversified Application of Vibro-Insulators

Applications of Vibro-Insulators, the combinations of rubber and metal used to eliminate vibration, have had a wide scope, according to a recent bulletin

from Goodrich, manufacturer of the devices. A partial list of some of the more extensive illustrations follows: electric motors, large and small; air compressors; punch presses; internal combustion engines, gasoline and Diesel, automotive marine, stationary; ventilating fans and blowers; weighing scales; delicate balances; compressors for electric refrigerators; radiators for cooling liquids; heavy mills; vibrating screens; trolley bases on trackless trolleys; motor-generator sets; high-speed grinders and buffers; slow-speed roll grinding machines; wire drawing machines; business calculating machines and tabulators; electric switchboards; electric typewriters, or "teletypes"; and airplane instrument panels.

American Zinc Sales Co., Columbus, according to A. C. Eide, manager of the pigment division, has appointed John H. Calbeck a director of research of the division, succeeding Harlan A. Depew, who resigned to join the Sherwin-Williams Co., Gloucester City, N. J. Mr. Calbeck is a graduate of Southwestern College, Winfield, Kans., 1913, and obtained his master's degree at the University of Kansas in 1915. He has been actively identified with the pigment industry since 1919, following service in France as a first lieutenant in chemical warfare service. Until 1927, Mr. Calbeck was director of research for the Eagle Picher Lead Co., and later engaged in private research and consulting work at Joplin, Mo. Since 1932 he has been identified with American Zinc Sales as a consultant on special pigment development. Mr. Calbeck is also the author of many comprehensive papers and articles on zinc and lead pigments, lithopone, and work of general interest to the paint and rubber industries. Besides he has developed patents now placed in general practice in the pigment industries.

Rein & Webster, Inc., manufacturer's representative, began operation last month with offices at 1412 Keith Bldg., Cleveland. Carrying a full line of die castings, plastics, rubber moldings, stampings, and screw machine products, the firm will supply manufacturers in Ohio, Pennsylvania, Indiana, and Michigan. Frank H. Webster is president, and John A. Rein, secretary-treasurer, of the new concern.

C. W. Seiberling, vice president and co-founder of The Seiberling Rubber Co., Akron, has been designated leader of the 1940 Akron Community Chest Drive, November 11 to 25. He is also credited with having originated the plan locally.

National Association of Waste Material Dealers, Inc., Times Bldg., New York, N. Y., will hold its fall convention at the Hollenden Hotel, Cleveland, O., October 27-29. The convention committee is headed by Joseph H Tyroler.

Ameripol Coming to Rubber Companies as "Hycar"

Products of the newly organized Hydrocarbon & Chemical Rubber Co., Akron, will be sold under the general trade name "Hycar," announced President Ross W. Thomas. In the near future the company will issue bulletins and technical data on its products, and samples will be available to prospective users, according to Mr. Thomas.

Hydrocarbon & Chemical Rubber Co. was formed by The B. F. Goodrich Co. and Phillips Petroleum Co. for the manufacture and sale of synthetic rubbers.

The Firestone Tire & Rubber Co., Akron, according to Lee R. Jackson, vice president in charge of sales, has appointed Wilbur Shaw manager of the aeronautics division. Mr. Shaw is well known in aviation circles, was formerly with the Air Corps Reserve, was co-owner and operator of the Los Angeles Aircraft Co., is president of the Indianapolis Aero Club, and belongs to the National Aeronautical Assn. and the Quiet Birdmen organization. He is also the winner of the 1937, 1939, and 1940 Indianapolis 500-mile automobile races.

Firestone Economic Research Bureau estimates that 6,400,000 tires will be retreaded this year, against 5,600,000 in 1939.

Mohawk Rubber Co., Akron, O., tire manufacturer, and Irving and Gurdie Fine, trading as **Imperial Tire Co.** and **Lafayette Tire Co.,** 1423 Bedford Ave., Brooklyn, N. Y., tire distributers, have entered into stipulations with the Federal Trade Commission, Washington, D. C., to cease and desist from certain representations in the sale of their products. The respondents each agree to cease using the numeral "6" in connection with the word "plies" or with any other word, as a mark, stamp, brand, or label for tires not composed of six plies, and from use on such tires or the wrappings thereof or in any other way, of the numeral "6" or of any mark, stamp, brand or label implying that the tires are composed of six or any other indicated number of plies which is in excess of the actual number. Each respondent also agrees to desist from use of the word "Dual" or the phrase "Extra-Heavy Duty" or other words of similar meaning as descriptive of the plies of which its tires are composed, the effect of which representation tends to convey the belief that the construction of the plies is such that their presence in the tires renders the tires of dual or double efficiency or capable of extra-heavy duty, as compared with tires containing a like number of plies of similar quality. The Brooklyn distributers also agree to cease employing the word "Factory" or any other words of similar meaning in advertising matter so as to imply that they actually own and operate or directly and absolutely control the plant or factory in which the tires they sell are made.

CANADA

Canada's production of rubber goods last year was valued at $58,800,000, $5,400,000 over 1938, but $1,300,000 under 1937. Domestic sales in 1939 were $4,600,000 higher, at $45,100,000, than in 1938, export sales, however, declined $874,779.

Manufacture of rubber tires for airplanes is booming owing to the demand for military aircraft, for which, by the end of July, orders had been placed for 3,200 planes. The Dominion Government has purchased special machinery costing several million dollars for manufacturing airplane tires and has installed it in three leading factories. As a result of civilian and military orders, all tire factories are now working at capacity; so, unless domestic demand slackens, further expansion of plants seems likely as the war demand grows.

Crepe rubber soles enjoyed fashionable prominence in sports footwear this summer. Canadian shoe manufacturers, catering for the British market, find a growing demand there for rubber substitutes for sole leather.

Glen Gay, chief chemist, Miner Rubber Co., Ltd., Granby, P. Q., having been called up for active service, has been granted a leave of absence for the duration of the war. Lieutenant Gay is with the 24/25th Field Battery, Royal Canadian Artillery, C.A.S.F., St. John's Barracks, St. John's, P. Q.

Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont., has subscribed for $250,000 of Canada's new 3% $300,000,000 war loan.

R. C. Berkinshaw, Goodyear's general manager, was speaker at the director's luncheon of the Canadian National Exhibition in Toronto. He stated the rubber industry, along with others, in doing its utmost to win the war must, however, retain as far as possible its regular markets in Canada. The industry also is preparing to "play its necessary part in the readjustment when peace comes."

Dominion Department of Munitions and Supply in its recent listings of contracts awarded includes: Canadian Fire Hose Co., Ltd., Montreal, P. Q., $36,000; Kaufman Rubber Co., Ltd., Kitchener, Ont., $33,900.

Dominion Rubber Co., Ltd., Montreal, P. Q., has laid foundations for an office building at Papineau Ave. and Craig St., East, at a cost of approximately $40,000.

Charles S. Band, vice president, of Gutta Percha & Rubber, Ltd., Toronto, Ont., was elected a director of the Canadian Surety Co. He is also on the board of several other Canadian companies.

Imports and Exports for July for the Dominion of Canada

During July, Canada imported 11,093,800 pounds of raw rubber, value $2,162,828, against 7,088,022 pounds, value $1,082,091, in July, 1939. Straits Settlements supplied 10,467,559 pounds, value $2,037,105; Ceylon, 527,000 pounds, value $103,359; United States, 87,956 pounds, value $19,921; and the United Kingdom, 11,285 pounds, value $2,443. Also imported in July was 356,505 pounds (dry weight) of latex, value $95,190, against 110,719 pounds, value $21,389. The Straits Settlements furnished 316,456 pounds of latex, value $83,625, and the United States, 40,049 pounds, value $11,565. In July, 1940, the United States also sent Canada its total importations of crude balata, 64 pounds, value $43, against 6,340 pounds, value $528 in July, 1939; raw gutta percha, 1,926 pounds, value $443, against none in July, 1939; and hard gutta percha in sheets, 30 pounds, value $88, against 976 pounds, value $1,019, in July, 1939. Most of the powdered and waste gutta percha came from the United States, which sent 1,076 hundredweights, value $4,192, out of total imports of 1,098 hundredweights, value $4,599. The remaining 22 hundredweights, value $407, were from the United Kingdom. In July, 1939, Canada's imports of powdered and waste gutta percha totaled 5,066 hundredweight, value $5,631.

All imported golf balls in July came from the United Kingdom: 3,867 dozen, value $7,193, against 5,112 dozen, value $10,176, in July, 1939.

July pneumatic tire casing exports were valued at $313,437, against $548,480 a year ago, the Dominion Bureau of Statistics reported. They went to fifty countries, including: United States, $86,634; Colombia, $42,687; Venezuela, $38,230; New Zealand, $24,985; Peru, $15,332; Chile, $10,244; Belgian Congo, $8,941; Jamaica, $8,380; Portugal, $8,165; Bolivia, $7,383; British South Africa, $5,319, Iran, $4,430; Trinidad, $4,219; and Panama, $4,210.

Canada's exports of rubber-soled canvas footwear declined sharply in July and were valued at $34,256, against $130,954 in July, 1939. British South Africa, the largest purchaser, took 7,850 pairs, value $6,114. The United Kingdom bought 324,451 pairs of rubber heels and 533,467 pairs of rubber boots and shoes.

Carriers for Pamphlet Raids

Canadian Industries, Ltd., Montreal, P. Q., in its house organ, *C.I.L. Oval*, reveals carriers for the first pamphlet raids on Germany started from Canada during the first World War. James Richmond, who contributes the information, states that at that time the leaflets traveled in small rubber balloons, and the only source of supply of suitable balloons was the Sterling Rubber Co., Ltd., Guelph, Ont. The balloons, containing the pamphlets, were inflated with hydrogen and released when the wind was right. They would rise to great heights until they burst and let the leaflets flutter down. Mr. Richmond discloses that balloons are today used as targets for aircraft and anti-aircraft gunners and as indicators to explore the weather of the upper air, charting safe airways for civil fliers, determining the height of clouds, wind direction, and velocity, and at night automatically light vari-colored lights indicating the height to which they have risen. Balloons made by Sterling range in diameter from a few inches to fifty feet when fully inflated. The largest balloons, for special observations in the stratosphere, rise fifteen or eighteen miles above the earth. Various chemicals supplied by Canadian Industries, add strength and durability to the latex which has been colored as desired.

MIDWEST

National Safety Council, Chicago, Ill., recently designated Earl Smithwick, of Detroit, Mich., who has driven Dodge trucks for 16 years, "champion safe driver" for driving 1,222,000 miles in interstate hauling without an accident. Mr. Smithwick believes lack of courtesy is the cause of many highway accidents and claims the remedy is simply a matter of extra courtesy and thoughtfulness, never putting another driver in a dangerous position. He also cautions against passing on curves and at the crest of hills and advises watching dips in the road at the bottom of which are curves.

Thirty-four rubber firms in the Midwest recently reported paying 18,815 employes $543,000 in wages, an increase of 0.2% in workers, but a decline of 0.3% in payments from the previous month.

Foster Dee Snell, head of the consulting firm of Foster D. Snell, Inc., 305 Washington St., Brooklyn, N. Y., recently addressed the Detroit-Strathmoor Kiwanis Club on "Chemistry Serving Industry" and discussed the diversified problems brought by manufacturers to consultants.

Baldwin Rubber Co., Pontiac, Mich., is reported to be operating at peak levels, exceeding the high of 1937.

Dryden Rubber Co., 1014 So. Kildare Ave., Chicago, Ill., is expanding its plant at Keokuk, Iowa, at a cost of more than $100,000. The project, to be completed this month, will increase production facilities about 50%. The new building, with 25,000 square feet, will increase floor space about 35%; extra equipment also is being purchased. The additions were necessitated by increasing demand for the company's products, and plans are being formulated to add additional rubber goods to the Dryden line.

Five Year Research Program on Reclaiming

The Midwest Rubber Reclaiming Co., East St. Louis, Ill., has an agreement with the Massachusetts Institute of Technology, Cambridge, Mass., covering a five-year research program. This program contemplates research in all fields of rubber reclaiming, with emphasis upon the reclamation of compounds made from synthetic rubbers. This project is under the direct supervision of Dr. Ernst A. Hauser. The actual work will be under the direction of Dr. Le Beau.

OBITUARY

W. F. V. Cox

WALTER FELIX VIRGIL COX, first and only secretary of the Institution of the Rubber Industry, London, England, since 1922, passed away in his sleep at his home in Kent on August 19. His heart had been bad a long time.

Mr. Cox lately was also appointed secretary of the Voluntary Control Panel and the Export Group. About 15 years ago with Basil Joy he had founded the United Secretaries Club, composed of secretaries of various organizations which are connected with the motor industry.

Virgil Cox was born in London on January 11, 1897. His school is Ongar, Essex. When 16, ill health compelled him to drop classes. After recovering, he did not resume his formal education.

Mr. Cox has written papers of interest to the industry. He is well-known also to chemists of America not only because of his wide activities with the I.R.I., but also from his trip to the United States and cooperation with the A.C.S. He also was an enthusiastic and good golfer.

He leaves his wife, a son, and a daughter.

Harry M. Flint

HARRY M. FLINT, development engineer on hose and belts for the Firestone Tire & Rubber Co., on August 14 died of a sudden heart attack at his home in Indianapolis. In 1918 he had joined the development department of the Gates Rubber Co., Denver, Colo., and five years later was made chief chemist. He also served as a director. After 20 years with the company, however, he left and became associated with the Crown Products Co., Omaha, Neb., for a year.

Mr. Flint was born in Garden Plains, Kan., May 16, 1893. He was graduated from the University of Colorado in 1918 with a B.S. in chemical engineering and received a second degree in 1930. He belonged to the American Chemical Society and Alpha Chi Sigma.

The widow survives.

Wm. T. Atkins

CEREBRAL hemorrhage caused the death, on August 13, of William T. Atkins, vice president in charge of marketing and a director of Skelly Oil Co., Kansas City, Mo. He came to Skelly in 1923 from the Community Service Station Co., Davenport, Iowa, where he had been vice president since August, 1921. At Skelly, Mr. Atkins was made retail station manager, El Dorado, Kans.; September, 1924, manager of the marketing department at Kansas City; in 1931, vice president in charge of marketing and then a director as well.

The deceased was born June 26, 1884, at Holden, Mo., where he attended grade school, his only formal education.

He belonged to the Rotary Club, the Kansas City Chamber of Commerce, the Board of Counselors of the American Petroleum Institute, the directorate of the American Automobile Association, the Shriners, and Knight Templars. Mr. Atkins was also deeply interested in the Kansas City Boys' Hotel, and the Mercy Hospital for Crippled Children.

Funeral services were held at Newcomber's Chapel, Kansas City. Burial took place August 16 at Holden.

Survivors include his wife, his mother, a daughter, a sister, and a brother.

Wm. G. Klauss

WILLIAM GEORGE KLAUSS, who retired as president of the India Tire Co., Mogadore, O., in 1936, succumbed to a heart attack on August 27 at his home in Congress Lake, O., where private funeral services were held on August 29. Interment, on September 5, was in Homewood Cemetery, Pittsburgh, Pa., where the deceased was born on November 25, 1878, and educated at a Lutheran school. He later attended night classes and Iron City Business College.

His first business experience was gained during four years with sheet metal manufacturers. The next four years were spent with Atwood & McCaffrey, Pittsburgh, where Mr. Klauss rose from timekeeper to general superintendent. Then for 12 years he was with Best Mfg Co., Pittsburgh, where he eventually became general superintendent. Another 12 years were passed in the employ of Johns-Manville Co., with Mr. Klauss serving as manager for the 13 Southwest states and later becoming general sales manager and assistant to the chairman of the board. In March, 1926, however, he was named president of the Federal Match Co., Chicago, Ill. But in October, 1928, he was appointed to a similar post with the India Tire & Rubber Co. and continued as such when the company was reorganized in 1934 as India Tire Co.

Mr. Klauss was a life member of Syria Temple, A. A. O. N. M. S.

His survivors include his wife, his mother, two daughters, a son, and two sisters.

Charles Herberich

AFTER a long illness Charles Herberich, for many years treasurer and a director of The General Tire & Rubber Co., Akron, O., passed away at his home in the Rubber City on September 16. He had also been identified with the real estate and insurance business for about 40 years and was prominent in Akron civic and banking affairs.

The deceased was born in Germany, April 4, 1878, but when he was four years old, the family migrated to Akron. Here he attended elementary school and night classes. At the age of 14 Mr. Herberich obtained employment with the American Hard Rubber and remained there seven years before joining his father's real estate concern.

He was also a Mason, a Shriner, and a Knight Templar, a member of the Portage Country, Akron City, and Rotary clubs, a former trustee of the Y. M. C. A., a former president of the local chamber of commerce, past president of the Boy Scouts and of the Association for Colored Community Work, treasurer of the Akron War Fund Chest, and a former member of the executive board of the Community Fund.

He leaves his wife, four daughters, a son, two brothers, four sisters, and three grandchildren.

The funeral took place on September 18, with interment in Rose Hill Cemetery, Akron.

Edouard Michelin

EDOUARD MICHELIN, lawyer, chemist, artist of high repute, and for many years head of the French tire manufacturing firm, Michelin & Cie., Clermont-Ferrand, France, died at his home at Orcines, France, on August 25, at the age of 84. He and his older brother, the late Andre Michelin, about 50 years ago acquired the firm originally established in 1832 by Barbier and Daubree and later began the manufacture of bicycle tires. Edouard Michelin is credited with having been the first to adapt the pneumatic tire for use on the automobile in 1895. Since that time Michelin tires have become world famous, and the organization at its strongest had interest in, among others, Michelin Tire Co., Milltown, N. J., (closed in 1930), Michelin Tire Co., Turin, Italy, Michelin Tire Co., Ltd., London, England, Michelin Deutsche Pneumatik A.G., and Citreon Automobile Co. The firm also developed (1932) tires for the Micheline, the pneumatic tired rail cars.

Edouard Michelin was a firm believer in the value of welfare work among his employes and claimed his company was prosperous because of the social work which it had started early in 1898. The deceased and his late brother are said to have foreseen the tremendous strides that would be made in aviation and prophesied the results of permitting Germany to build commercial airplanes, which, they pointed out, could easily be transformed into bombers.

John H. Diehl

JOHN H. DIEHL, veteran rubber executive, died in Asheville, N. C., of a heart ailment on September 13. Born in Akron, O., 68 years ago, he started with The B. F. Goodrich Co. in 1894 and later served as manager of its Philadelphia and Buffalo branches. Then Mr. Diehl joined the Portage Rubber Co., Akron, as sales manager, at the time of its organization in 1917. Five years later he became general sales manager of The Mason Tire & Rubber Co., Kent, O., and in 1918 was also named a vice president and a director. He resigned in 1928.

He is survived by a daughter, three sons, a brother, and a sister.

Last rites were held in Akron on September 17. Glendale Cemetery was the place of burial.

P. G. Himmelright

ON AUGUST 31, Paul Giffin Himmelright, president of the Monarch Rubber Co., Hartville, O., died after an emergency operation performed two weeks previous in a Canton hospital. He had joined the company more than 20 years ago and in 1926 became vice president and general manager and in 1938 president.

Mr. Himmelright was born in Piqua, O., June 26, 1890. He attended grade and high schools there and was graduated from Miami University, Oxford, with a B.A. degree in 1912.

The deceased belonged to the Masonic order, Theta Beta Pi fraternity, and the Canton Club. He was also president of the Congress Lake Club and a director of First Trust & Savings Bank, Canton.

He is survived by his wife, his mother, and a brother.

Funeral services were conducted on September 3 with burial in Westlawn, Canton.

Rubber Division Meeting

(*Continued from page* 54)

J. Kvet, Baldwin Rubber Co., Al Fuhrman, Midwest Reclaiming Co., Fred Wehmer, Minnesota Mining & Mfg. Co., J. H. Norton, E. I. du Pont de Nemours & Co., Inc., J. Harvey Doering, Ford Motor, W. M. Phillips, General Motors Research, J. W. McCourtney, Chrysler Motor, J. W. Temple, U. S. Rubber, Sam Adinoff, St. Clair Rubber Co.

Fall Meeting of New York Group To Be Held October 18

ONE or more prize winning essay contest papers will be presented before the New York Group, Rubber Division, A. C. S., at a meeting on October 18, at the clubrooms of the Building Trades Employers' Association, 2 Park Ave., New York, N. Y. The essay contest, sponsored by the group, is

restricted to group members under 35 years of age, with subjects taken from rubber and related fields. The balance of the program will depend upon the number of contest papers presented. The technical session will begin at 4 p. m., followed by dinner.

Buffalo Group Meets October 17

THE Buffalo Group, Rubber Division, A. C. S., will convene at the Hotel Lenox, Buffalo, N. Y., on October 17, with dinner at 6:30 p. m. The speakers follow: Charles Summers of the Niagara-Hudson System, and F. M. Andrews, of the Hydrocarbon Chemical & Rubber Co., who will present an illustrated talk on "Hycar."

Chicago Group Meets October 18

DR. ARTHUR CAMPBELL, of the Commercial Solvents Co., New York N. Y., will present a paper on the "Properties of Various Types of Carbon Blacks," at the first fall meeting of the Chicago Group, Rubber Division, A. C. S., to be held October 18, at the Hotel Sherman, Chicago, Ill. Contrary to previous practice, the technical session will start at 6.45 p. m., followed by dinner at 7.45 p. m.

Frolich to Address Boston Group

AT A meeting set for October 24, 6:30 p. m., at the University Club, Boston, Mass., the Boston Group, Rubber Division, A. C. S., and members of the Northeastern Division, A. C. S., who have been invited to attend the rubber group's meeting, will hear Per K. Frolich, director of Chemical Division, Esso Laboratories, Standard Oil Development Co., repeat his address, "Butyl Rubber—A New Hydrocarbon Product," which, with a well-arranged moving picture, was received with much interest when presented at the General Session of the American Chemical Society and again at a technical meeting of the Division of Rubber Chemistry, held in Detroit, Mich., during the week of September 9. Co-authors are R. M. Thomas, I. E. Lightbown, W. J. Sparks, and E. V. Murphree, all of Standard Oil.

After the paper and picture Dr. Frolich will answer questions relating to the processing, compounding, application, etc., of the new synthetic rubber. A large attendance is anticipated, and all those planning to attend are urged to make their reservations promptly with D. D. Wright, secretary-treasurer of the group, c/o Hood Rubber Co., Watertown, Mass. Dinner tickets are $2 for non-members and $1.75 for members.

Akron Group to Meet November 8

WARREN H. CHASE, of the Bell Telephone Co., will discuss recent developments in the transmission of voice before the Akron Group, Rubber Division, A. C. S., at a meeting on November 8, at the Akron City Club, Akron, O. Dinner is scheduled for 7:00 p. m.

FROM OUR COLUMNS

Fifty Years Ago—October, 1890

The Brooklyn bridge is a great supporter of electric wires, and a vast number of cables which would otherwise have to cross the East River under water take this safe and convenient route. (p. 5)

In 1851 there were exported from Para 2,944,000 pounds of rubber in bulk, valued at $552,000, and 192,000 rubber shoes, which brought $38,000. The quantity of all rubber exports had increased in 1883 to 11,616,000 pounds, 14,400,000 pounds in 1885, and 17,792,000 pounds in 1888. (p. 9)

There are a total of 959,500 square miles in South America, in which the best species of *Hevea* are known to grow. (p. 9)

When experimenting with India rubber, Nathaniel Hayward put almost everything that he had into one batch, and among other things, a piece of roll brimstone. That batch when put in the sun became partly vulcanized and he was delighted. (p. 16)

You may rest assured that anything within my power to do, will be done, to ascertain the possibility of acclimating the proper rubber tree in this country. [From a letter of J. M. Rusk, Secretary of Agriculture, to the Editor of INDIA RUBBER WORLD]. (p. 23)

During the recent heavy rains and damp weather, the rubber shoe factories were obliged to keep steam on the making-up and stock rooms, because the dampness was getting into the linings of the boots and shoes, and mildew was feared. (p. 25)

The largest mills use so much as three hundred tons of litharge annually. (p. 27)

In vulcanization particularly, the lack of regulation for heat has cost many thousands of dollars. (p. 29)

25 Years Ago—October, 1915

Over two-thirds of our supply of crude rubber during the last eight months has come from London. (p. 1)

In the East many of the plantations have already reduced the cost of a pound of rubber to 25¢, and in some cases to less than 20¢. (p. 2)

Coagulation of latex by electricity has been successfully performed on plantations where acetic acid was scarce. This coagulation is effected in a porous vessel with carbon electrodes, using a low tension current. (p. 11)

Instead of cotton cords in their tires, the Anderson Rubber Works uses wires that are twisted and wound with friction tape, forming metallic cables. (p. 24)

The time has not arrived when a nation's good will towards its neighbors can constitute a sufficient defense. (p. 26)

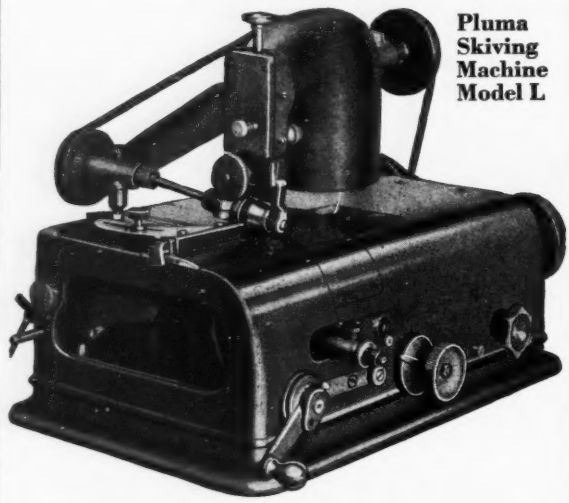
Census of Chemists

A CENSUS of all chemists and chemical engineers in the United States, recording in detail the specialized services which they are prepared to perform, will be taken by the American Chemical Society at the request of the Executive Office of the President of the United States. The undertaking was characterized as a step of major importance in the development of preparedness plans. The work, to be financed by the Society, will be directed by E. M. Billings, of the Eastman Kodak Co., Rochester, N. Y. The census will first cover members of the A. C. S. and later non-members.

Symposium in Akron on the Physics of Rubber

THE Ohio Section of The American Physical Society will hold a symposium on "The Physics of Rubber" at The University of Akron, Akron, O., October 11 and 12. On the afternoon of October 11 there will be tours to The B. F. Goodrich Co. plant and the Aeronautical Experimental Laboratories of the Guggenheim Airship Institute, followed by dinner at the University at 6:30 p.m. and an evening program comprising a motion picture on "Physicists at Work" and an address on "Physical Methods for Investigating the Structure of Molecules," by P. Debye, Cornell University.

The eight papers scheduled for presentation on the morning of October 12, starting at 9:30 a.m., follow: "Physics in the Manufacture and Use of Rubber," James W. Schade, Goodrich; "Thermal Problems in Rubber Manufacture," S. H. Hahn, Goodrich; "The Optical Properties of Rubber," L. A. Wood, National Bureau of Standards; "Dielectric Constant and Power Factor of Koroseal at Radio Frequencies," O. R. Fouts, University of Akron; "An X-Ray Study of the Proportion of Crystalline and Amorphous Components in Stretched Rubber," J. E. Field, Goodyear Tire & Rubber Co.; "Infra-Red Spectra of Rubber," W. C. Sears, Goodrich; "Some Applications of the Kinetic Theory of Rubber Elasticity," H. Mark, Polytechnic Institute of Brooklyn; "Physical Characteristics of Synthetic Rubber," J. N. Street and J. H. Dillon, Firestone Tire & Rubber Co. The two-day program will be concluded with a luncheon at the University.



Pluma Skiving Machine Model L

FOR SKIVING FABRIC OR CORD TIRE PATCHES AND RELINERS

THE Pluma Skiving Machine — Model L is particularly adapted for skiving belting, rubber mats, etc., and all kinds of material used in the manufacture and reclaiming of Auto Tires.

In Rubber Shoe Factories it is used to advantage in skiving counters, also rubber soles and heels where a rolled edge is desired.

This machine is equipped with a steel feed roll especially suited for this class of work, also with a power top presser roll having a double end bearing. It has an improved gear driven grinder, which eliminates belt troubles, where water is used on the knife head parts. These features, together with a knife six inches in diameter, enable the operator to skive a uniform wide bevel scarf. It can also be fitted for a narrow scarf if desired. A water device for wetting the knife when used for skiving rubber is also provided.

UNITED SHOE MACHINERY CORP.
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Haverhill, Mass.	145 Essex Street
Johnson City, New York	19 Jennison Avenue
Lynn, Mass.	525 Union Street
Milwaukee, Wisconsin	922 No. Fourth Street
New York, New York	110 Fifth Avenue
Philadelphia, Penna.	221 No. 13th Street
Rochester, New York	60 Commercial Street
St. Louis, Missouri	2200 Washington Avenue
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EUROPE

SOVIET RUSSIA

Data on Sovprene

Besides butadiene rubber, the Russian synthetic rubber factories also produce different types of sovprene, the Russian chloroprene rubber. These sovprene rubbers are of various degrees of plasticity; a considerable part shows plasticity ranging from 0.55-60 to 0.70-0.75 (Karrer); but the plasticity of other types may be as low as 0.15-0.20 or as high as 0.80-0.85, and even exceed the latter value, to approach the fluid state.

Under existing factory conditions, the most suitable plasticity for sovprene rubber is 0.55-0.65. Sovprene with higher or lower plasticities is difficult to work; the softer types become sticky during processing, while the stiffer kinds not only have a very rough, broken surface, but crumble when milled. In fact there are difficulties with these types of sovprene at every stage of manufacture, which tend to limit their use.

Softeners or fillers, as the case requires, may be added to improve processing qualities, but at the expense of elasticity.

A solution for the difficulty is claimed to have been discovered at the Kr. Treugolnik where it has been found that, unlike butadiene rubbers, hard and soft types of sovprene can be successfully blended to produce a homogeneous mass, the plasticity of which depends on the proportions and the plasticity of the sovprene types used. It is claimed that not only is a rubber of the desired plasticity obtainable in this way, but the final product has better mechanical properties than the initial materials.

Thus to obtain a sovprene blend with a plasticity of 0.55-0.65, a mix is prepared of two parts of sovprene with a plasticity of 0.66-0.75 and one part with a plasticity of 0.20-0.35. The harder rubber is first passed through the rolls for seven to eight minutes; next the more plastic rubber is worked for two to four minutes; the two are then milled together for another eight to ten minutes; the whole process takes 17 to 22 minutes; the rolls are kept at a temperature of about 40° C.

New Varnish for Rubber Footwear

Hitherto varnishes for rubber footwear have been made with white spirits as the solvent. But since a shortage of this material exists, attempts have been made for some time to produce an emulsified varnish in which water replaces the spirits.

It is now reported that the Kr. Bogatyr has developed a stable and homogeneous varnish in which tri-ethanolamine and oleic acid are used to form the emulsifying agent. A special method of varnishing had to be developed to overcome the difficulties caused by the higher viscosity and poorer spreading qualities of the new varnish. After the difficulties were met, first quality goods were obtainable by the new process, it is claimed.

GREAT BRITAIN

Rubber in Air Raid Precautions

The use of latex in paints or solutions to be applied to windows to reduce the danger of flying glass during air raids has been advocated for some time. Lately the efficacy of such preparations has been questioned, chiefly on the score of their durability, as it is claimed that the latex films have no great lasting power and become useless after a few months. Jeavons, Tinto & Co., dealer in latex, say this circumstance should not be allowed to interfere with the use of latex for the purpose

described since, after all, the main concern at present is for protection during the months immediately ahead.

The firm further declares that it is a national duty for suppliers of latex to cooperate with chemists and paint factories in an effort to develop suitable anti-splinter compounds based on latex.

Meanwhile individuals appear to be attempting to solve the problem of flying splinters in their own way. James Ebdon, of Ebdon's Autos, hit upon a novel plan for protecting his large show-room windows by using old tires as buffers. These tires, attractively painted, are braced to the center of the windows by means of wires which are stretched tightly from each corner and are said to form an inexpensive adequate protection.

The Export Drive

The British are going ahead with their efforts to increase their export trade, and the rubber industry in various parts of the country is doing its share. From the Lancashire district and from Scotland come reports of greatly increased activity in the production of goods first for defense purposes, of course, and then for export. Only a small proportion of output is destined for domestic civilian demand, and manufacturers will make no promises with regard to deliveries of goods to meet this demand so that dealers are resigning themselves to a very long wait for the goods they have ordered.

There seem to be few difficulties regarding raw materials, although firms in Scotland are reported to be concerned about supplies of lithopone and barium sulphate and find themselves obliged to keep large stocks of these materials on hand.

Prices for single yarn have been under control since January, 1940, and recently price control has been extended to double yarns.

In line with export efforts, the Cotton Controller allows concessions on prices of yarns intended for export goods.

To aid the export drive in South America the British Standards Institution will soon publish a handbook in Spanish giving information regarding all kinds of British manufactures in which Latin American countries might be interested. This handbook, giving descriptions of goods as well as technical data, is said to be the first of its kind. It seems to be the intention to distribute it among importers, salesmen, and engineers throughout South America and to follow this publication by other volumes in which individual industries will be dealt with in special detail.

A supplement to the handbook, also printed in Spanish, is planned which will take the form of a classified directory of British manufacturers and the products they make.

Women in Industry

War demands necessitate women taking the place of men in industry. Normally the rates of pay for women are considerably below those for men for the same type of work; consequently the danger exists that the increased employment of women at the lower wages might have an adverse effect on wages and employment conditions in general. The Amalgamated Society of India-rubber, Cable & Asbestos Workers is attempting to prevent this by inducing firms to agree to pay women the same rates as men and to replace the women by men again when the war is over. One firm in the Manchester area has already made this agreement.

British Rubber Trade

Great Britain imported crude rubber valued at £1,197,000 in June, 1940, against £810,000 in June, 1939. The total value of crude rubber imports during the first half of 1940 was more than £7,000,000, an increase of almost £1,000,000 over the total of the same period last year. The value of imports of rubber manufactures also rose, chiefly as a result of higher prices, and were £534,000 in the first six months of 1940, against £470,000 in the 1939 period.

Despite the loss of various European markets, the value of rubber goods exports in June, 1940, rose to £135,000 in June, 1940, against £123,000 in June, 1939. For the first half of 1940 the total was £1,257,000, against £753,000 in 1939.

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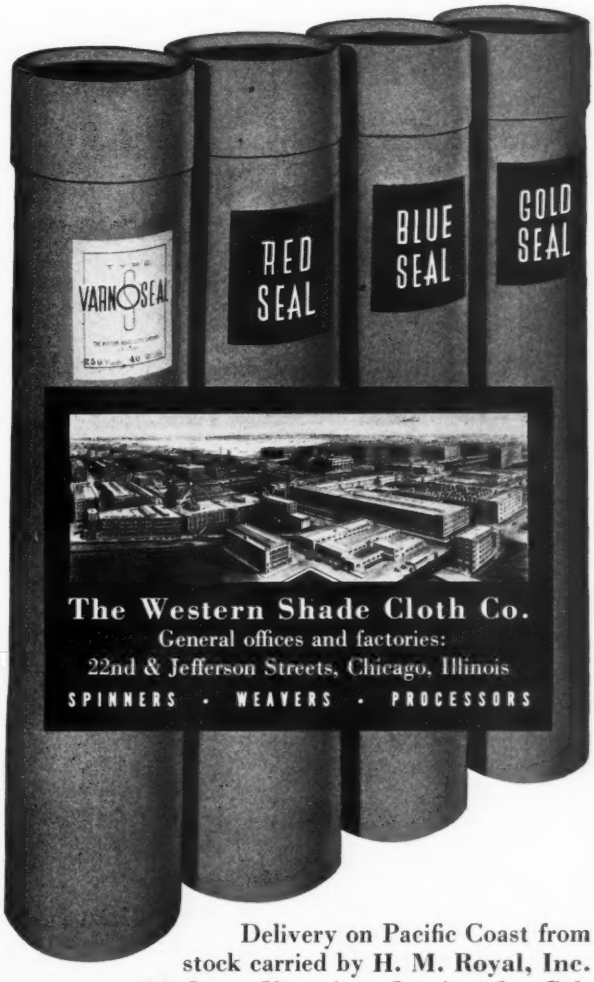

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GERMANY

Kabelwerk Duisburg, Duisburg, capitalized at 6,000,000 reported gross receipts of 8,140,000 marks in 1939, against 7,490,000 marks in 1938. Wages and salaries accounted for 3,980,000 marks, against 3,260,000 marks, and taxes took 840,000 instead of 740,000 marks. After writing off 550,000 marks (against 850,000 in 1938) net profits of 720,000 remained. A dividend of 12% was paid.

Veritas Gummiwerke, A.G., with factories at Lichterfelde, Berlin, and Gelnhausen, showed net profits of 64,698 marks last year and declared a 6% dividend. Like many others, this company, which has modernized its works, was forced to make radical changes in its manufacturing program to meet the demands created by the war. For one thing, production has been diverted from the usual type of goods to those essential for war purposes. Furthermore domestic raw materials must to a large extent be employed. Fortunately the firm had considerable experience in using these materials and so met with little difficulty.

Deutsche Kabelwerke, A.G., increased its capital in 1939 by 2,840,000 to 8,000,000 marks and has also taken a long term loan. A subsidiary, Julius Friedlander Gummiwarenfabric, G.m.b.H., has been wound up, while the operation and management of the Deka Technische Gummiwaren, G.m.b.H., have been transferred to the Gummiwerk Berlin division of the Deutsche Kabelwerke. Net profits of the main concern were 800,088, against 586,041 marks, and a dividend of 8% instead of 7% was turned out.

Felten & Guilleaume Carlswerk A.G., Koln-Mulheim, manufacturer of cables and technical goods, reported gross earnings of 41,679,208 marks in 1939. Among the items noted on the balance sheet were: wages and salaries, 14,894,286 marks; social taxes, 961,238 marks; amortization, etc., 5,701,300 marks; taxes, 13,670,793 marks; reserves, 1,000,000 marks. Net profits were 5,293,570 marks, and the dividend was 8%.

NETHERLANDS

Netherlands figures for 1939 show a substantial increase in imports of crude rubber and most articles of rubber, but a decrease in exports of a number of rubber manufactures, as compared with 1938.

Crude rubber imports were 7,525 against 5,325 tons; imports of manufactured goods included 258,947 against 257,439 automobile tires; 201,732 against 199,306 automobile tubes; 653,521 against 647,652 cycle tires; 479,212 against 390,303 cycle tubes; 474,783 pairs footwear against 433,665 pairs; and 16,592,200 meters against 13,427,300 meters elastic bands.

Exports of automobile tires dwindled noticeably, numbering 705 against 2,018; while automobile tubes fell to 59 from 1,003; cycle tires were 283,948, against 299,974 units; and tubes, 169,865, against 204,834 units. Footwear exports were only 17,574, against 35,012 pairs. Rubberized garments for men and women, however, rose from 77 to 129 tons.

FAR EAST

NETHERLAND INDIA

Taxes Increased

A war export duty of 5% ad valorem, effective August 1, 1940, was imposed on exports of various commodities including rubber. This tax is in addition to already existing duties and taxes on the above exports.

The Netherland India sliding scale export duty on native and estate rubber, fixed at 0.019-guilder per half kilo for 1940, was increased to 0.024-guilder per half kilo for 1941. The average standard-sheet price corresponding to the increased duty is 0.347-guilder per half kilo; that for the determination of the 1940 duty was 0.298-guilder per half kilo.

Dialysis of Latex

The importance of dialysis from a technical point of view is being recognized more and more, and the process is also proving of interest for latex not only as an aid in physico-chemical investigations, but also, for instance, in preparing special types of latex.

In a recent article G. E. van Gils[1] discusses the dialysis and electro-dialysis of latex, properties of dialyzed latex, and methods and apparatus. Dialyzed latex has a much lower ash content than ordinary latex; the removal of organic dialyzable, non-rubber constituents is shown by the decrease in the difference between D.R.C. and T.S. There is a reduction in the nitrogen content due to the removal of compounds containing nitrogen, but this is usually not large as the greater part of these substances, the proteins, are not dialyzable.

Films of dried dialyzed latex are much lighter in color and much more transparent than films of ordinary rubber. Without ammonia, dialyzed latex putrifies just like ordinary latex, but has a less unpleasant odor.

The coagulation of dialyzed latex brought out several interesting differences as compared with ordinary latex. Thus when muriatic or formic acid is added to dialyzed latex, the pH is lower than for ordinary latex similarly treated, because of the absence of buffers. (A previous article[2] revealed that for the same reason the pH of dialyzed latex to which a given quantity or NaOH has been added is higher than the pH of ordinary latex under the same circumstances.) Tests indicate that the first coagulation zone of dialyzed latex is between pH=3.9 and pH=5.1; whereas for ordinary latex it is between pH=5.6 and pH=3.5. Coagulation of dialyzed latex is therefore only possible with formic acid concentrations between 0.6 and 2.4m acid equivalent per 100 ml. mixture, and muriatic acid concentrations between 0.6 and 1.2m acid equivalent per 100 ml. mixture, figures which are very close together.

When NaCl (8m equiv. NaCl per 100 ml. mixture) is added to dialyzed latex, the coagulation zones are extended, the upper limit from pH=5.1 to pH=5.3 (approximately), and the lower limit, from pH=3.9 to pH=2.3, a phenomenon for which a tentative explanation based on colloid-chemical observations is offered. The curious coagulation phenomena of dialyzed latex are to be further investigated.

Mr. van Gils also explains the principles of electrodialysis, which is ordinary dialysis combined with electrical transportation of ions, and describes the apparatus employed. When this process is carried out without stirring, a concentration effect is observed (the so-called "Schichtungsphenomen"—literally "piling or heaping up phenomenon"). A method of concentrating and purifying latex has been developed on the basis of these findings for which Dunlop Plantations, Ltd., has obtained a patent (No. 80,694, Neth.).

[1] "The Dialysis of Latex and the Properties of Dialyzed Latex." Communication No. 18, Rubber Research Division of the West Java Experiment Station. *Arch. Rubbercultuur*, 24, 2, 74-97 (1940).
[2] "Contribution to the Knowledge of the Creaming Process." G. E. van Gils, *Ibid.*, 23, 256 (1939).

MALAYA

Santobrite

Up to the present no material has been found which answers the exacting requirements of a good preservative of latex so well as ammonia. But ammonia has some disadvantages: it is volatile and unpleasant to work with; it is a hydrolizing agent and reacts with substances present in latex,

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causing variations in stability on storage; its presence interferes with processing in the rubber factory, and in some cases it must be removed before the latex can be utilized.

Alternative preservatives, therefore, for years have been sought and form the subject of two recent publications from the Rubber Research Institute in Malaya.

The Planters' Bulletin, May, 1940, deals with Santobrite made by the Monsanto Chemical Co., St. Louis, Mo., U. S. A. This material, the sodium salt of penta-chlorphenol, was brought to the attention of the Rubber Research Institute about two years ago and is considered the first satisfactory alternative for ammonia. Thorough tests indicated that while it is not the ideal preservative, it has much to commend it. Santobrite can be used alone or in combination with a small amount of ammonia when much less of the former is needed. Thus 1% of Santobrite is necessary when it is used alone, but this can be reduced to 0.3% if 0.1% of ammonia is added, and to 0.15%, with 2% ammonia.

It is calculated that a saving of $1.50 (Straits) can be effected on the cost of preservation for every 1,000 pounds of latex, by using a combination of 0.3% Santobrite plus 0.1% ammonia, instead of the usual 0.7% ammonia. As Santobrite must be added in the form of a 25% solution, there is a reduction in the D.R.C. of the latex amounting to about 0.3%.

Available evidence shows that the properties of rubber made from Santobrite latex are apparently in every way as satisfactory as those of rubber made from ammoniated latex. Outside of the necessary adjustments in technique, the use of Santobrite does not appear to have caused any difficulties. Whether Santobrite will replace ammonia as a preservative in the future, depends ultimately on the demands of the consumers. Some manufacturers are known to favor Santobrite latex, and, according to the press, one large producer is now using Santobrite as a preservative, which may be due to the present situation regarding supplies. But it is considered that there is a future for Santobrite and similar bactericides. **Meanwhile supplies of Santobrite are coming** into the country, and the Rubber Research Institute offers to advise producers on its use, if necessary.

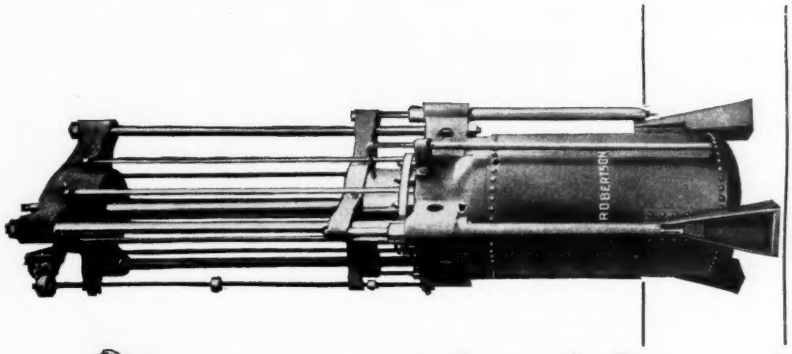
Preserving Latex by Sterilization

The second article[1] discusses experiments made to test a method of preserving latex recently suggested by Spence, in which latex is sterilized by autoclaving in the presence of a buffer reagent. Quoting Spence, the authors show that he aimed to eliminate "the objectionable changes known to develop in ammonia-preserved latex and to produce a stable product, free from the practical difficulties resulting from the presence of alkali in latex" by investigating the factors which affect the stability of *Hevea* latex de-ammoniated by dialysis and by making studies with latex from guayule. Spence's method was to buffer the latex with a solution of M/20 sodium dihydrogen phosphate containing the requisite amount of M/20 caustic soda to produce a mixture having a pH of approximately 7. The stability of the latex, Spence showed, was largely dependent on its reserve buffer strength, and by increasing this strength by using an artificial reserve of buffer solution having the same pH as that of the latex itself, the stability of the latex could be maintained over a prolonged period without coagulation taking place; fresh latex buffered in this way could be heated to temperatures well above those employed in modern bacteriological practice without coagulation ensuing. These observations paved the way for a permanently stable and neutral sterile latex, Spence declared.

Davey and Beeley endeavored to discover whether this process had any commercial possibilities, and their experiments led to the conclusion that buffered latex sterilized by autoclaving is non-resistant to bacteria and is therefore unstable and coagulates when exposed to infection. The method is of academic interest only and has no value as a practical method for the large-scale preparation and shipment of latex from the producing countries.

(*Continued on page* 90)

[1] "Note on the Preservation of Latex by Sterilization in the Presence of a Buffer Solution." W. S. Davey and F. Beeley, *J. Rubber Research Inst. Malaya*, June, 1940, pp. 67-77.



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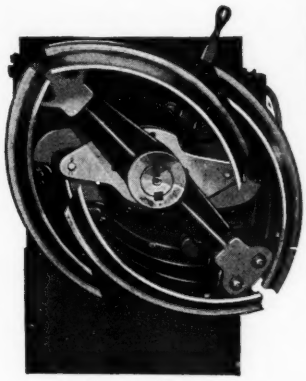

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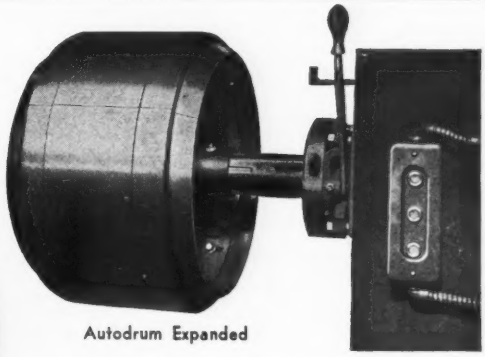

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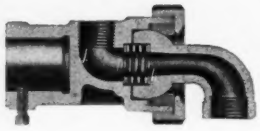

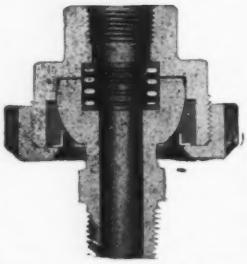

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Editor's Book Table

BOOK REVIEW

"High Polymers." Volume I. Collected Papers of Wallace Hume Carothers on High Polymeric Substances. Edited by H. Mark and G. Stafford Whitby. Published by Interscience Publishers, Inc., 215 Fourth Ave., New York, N. Y. 1940. Cloth, 6 by 9 inches, 478 pages. Subject and author indexes. Price $8.50.

No phase of organic chemistry has grown more rapidly in the past two decades than that which relates to the high polymers. Scientific investigations in this field have been voluminous; new basic concepts have been evolved; and new industries have been born. The chemistry of the high polymers has rightfully earned for itself a place alone—as a distinct science. Recognizing this fact, a series of monographs on the chemistry, physics, and technology of high polymeric substances has been initiated. The primary intention is to cover the most significant studies in this field in such a manner that this new branch of chemistry will be firmly anchored in the fundamentals of chemical science.

In publishing as Volume I the papers of Carothers, no more fitting way could have been conceived in starting this series. Carothers' work in this field is classical in that it embraces the first broad attempt at a systematic and comprehensive study of polymerization. The volume is divided into three parts. "Studies on Polymerization and Ring Formation," as Part One is called, deals essentially with the mechanism of condensation polymerization and the condensation products such as the polyamides, polyesters, and polyanhydrides. This group of 28 papers, in addition to contributing to our basic knowledge of polymerization, includes studies which led to the industrial development of the polyamide fiber known as nylon.

Part Two, "Acetylene Polymers and Their Derivatives," contains a series of 22 papers of fundamental importance in the field of polymers produced by the self-addition of conjugated systems, particularly of the butadienoid type. Special treatment is given to the influence of substitution on the polymerization of such systems and the chemical behavior of conjugated systems containing both an ethylenic and acetylenic linkage. Of outstanding industrial importance in this series is the discovery of the synthetic rubber neoprene.

Part Three, "Miscellaneous Papers," comprises a group of four miscellaneous papers embracing chiefly some of the more general aspects of polymerization. The book comtains a biography of Carothers by Roger Adams and concludes with a bibliography of Carothers' publications and patents pertinent to this field.

NEW PUBLICATIONS

"List of Publications of the Department of Commerce." United States Department of Commerce, Washington, D. C. Available upon request from the Superintendent of Documents, Washington. 158 pages. Listed in this booklet, which has been revised up to July, 1940, are all of the available publications of the Department of Commerce and its branches.

"Rubber: History, Production, and Manufacture." P. W. Barker. Leather and Rubber Division of Bureau of Foreign and Domestic Commerce. Available from Superintendent of Documents, Washington, D. C., at 10¢. 53 pages. This is a general pamphlet on rubber, briefly treating of its history, production, and manufacture. More attention has been given to the subject of production of rubber than to rubber manufacture. Sections also deal with government control, reclaimed rubber, synthetic rubber, and rubber derivatives. Statistical tables and a bibliography are included.

"Properties and Uses of Gastex and Pelletex." General Atlas Carbon Co., 60 Wall St., New York, N. Y. 24 pages. This booklet, attractively bound in board covers, comprehensively reviews the production, development, properties, and application of Gastex and Pelletex, the firm's soft carbon blacks. In the discussion of their use in rubber, good aging, low volume cost, and ease of dispersion, processing, and handling are stressed. The advantages of substituting Gastex or Pelletex (free-flowing dustless form of Gastex) for part of the channel black in tire stocks are dealt with, as is also their use in reclaiming. A separate section is devoted to use in synthetic compounds where high loading is an important economic factor.

"Football Schedules—Season 1940." General Atlas Carbon Co., 60 Wall St., New York, N. Y. 20 pages. Football fans will welcome this handy booklet, supplied by the maker of Gastex and Pelletex, which contains fall schedules of college and National Football League teams, in addition to other interesting data on the game.

"The Great Reliance of National Defense." No. 37 in a series of booklet-editorials published by Farrel-Birmingham Co., Inc., Ansonia, Conn. 18 pages. Data in this study show the relative man-power and man-hour resources of the United States as compared to Germany and Italy combined. The one factor which compensates for our relative inferiority in man-hours, according to this booklet, is the tremendous productivity per man-hour of our highly mechanized industries. The conclusion is reached that the machine-producing industries, through their progress since 1914-1918, have become "The Great Reliance for National Defense."

"The Vanderbilt News." September-October, 1940. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 24 pages. This entire issue is given over to Kalvan, the firm's recently introduced calcium carbonate pigment. Compounds and physical test data cover: increased loadings, acceleration, masterbatching, and comparison with Gilder's whiting. Several commercial rubber and synthetic rubber compounds are included.

"Inspected Fire Protection Equipment and Materials." July, 1940. Supplement to January, 1940, List. Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, Ill. 16 pages. This supplement contains only listings established subsequent to the publication of the January, 1940, list. Fire hose is included in the supplement.

"Using Ruggedwear? Let Us Show You How—" Flexrock Co., 23rd and Manning Sts., Philadelphia, Pa. 4 pages. This folder highlights the firm's new Ruggedwear resurfacer for repairing concrete work, particularly factory floors. This material combines Montmorillonite, asphalt, and cellulose with a new tough fibrous rock, Chrysotile.

"Cotton Production in the United States." United States Department of Commerce, Washington, D. C. For sale by the Superintendent of Documents, Washington, 10¢. 37 pages. The statistical tables in this bulletin for the crop of 1939 include data on: cotton and linter production (1899 to 1939); production by states (1936 to 1939); cotton ginned by states (1936 to 1939); average gross weight of the several kinds of bales (1937 to 1939); number of ginneries in 1939; cotton ginned by counties (1936 to 1939).

"The Eastman Report Finds That—Highway Users Pay Their Way and More." National Highway Users Conference, National Press Bldg., Washington, D. C. 32 pages. This booklet summarizes that portion of the report on "Public Aids to Transportation," by Hon. Joseph B. Eastman, chairman of the Interstate Commerce Commission, that deals with highway matters, and points out that the national highways are not subsidized by the government as are the airways, railroads, and waterways. Those interested in the development of national transportation policies will find the information contained in this booklet interesting.

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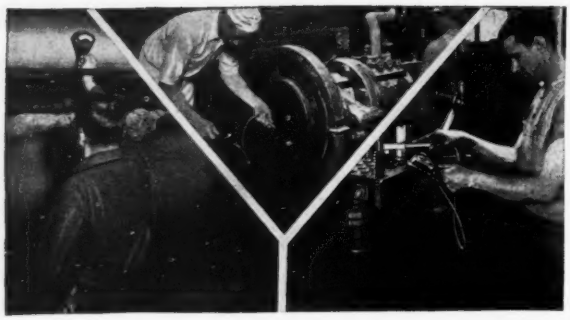

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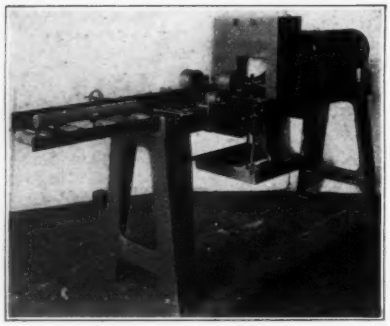

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"'Santocure.' An Accelerator for Rubber Vulcanization." Monsanto Chemical Co., Rubber Service Department, Akron, O. 52 pages. The data contained in this booklet is intended to give the rubber compounder some insight into the general behavior of the accelerator, "Santocure." Test compounds using "Santocure" alone or in combination with other accelerators and with various compounding ingredients are presented, together with charts on physical test data—modulus, tensile strength, and elongation. T-50 test results are given for two types of stocks, and a number of formulas for specific applications are included.

"Oxygen Pressure Method for Accelerated Aging Tests of Rubber Compounds." Bulletin of Research. June, 1940. Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, Ill. 16 pages. This bulletin is based on a paper, by E. N. Davis, presented December, 1939, before the Flexible Cord Section, National Electrical Manufacturers' Association. It describes the apparatus and operations employed by Underwriters' Laboratories, Inc., for accelerated aging tests of rubber by the oxygen pressure (bomb) method, particularly as these tests relate to insulation. Refinements and extensions in the method are described.

"The Storage Battery Manufacturing Industry. 1940 Year Book." The Association of American Battery Manufacturers, Akron, O. 28 pages. Price 25¢. Among statistical items in this booklet of particular interest to the storage battery industry are figures on car and truck registrations, battery production and exports, trends in motor transportation, and prices and consumption figures on raw materials used in the industry.

"Automobile Facts and Figures." Twenty-second edition, 1940. Automobile Manufacturers Association, Detroit, Mich. 96 pages. This automotive review for the year 1939 covers production, registration, sales, employment, highways, taxes, and use. Included is a detailed inventory of street and road systems, presented in figures and maps from the U. S. Public Roads Administration. According to the report, the automobile was responsible for the consumption of 473,600 long tons of rubber, or 80% of the total consumed in this country during 1939.

"The Story of Cotton." Bibb Mfg. Co., Macon, Ga. 52 pages. In straightforward simple language this story of cotton, from the raw material to the finished product, is told. Interwoven with this tale is the story of Bibb with photographs depicting the firm's activities in this field. A final section of the booklet discusses Bibb heat resistant cord for tires and other rubber products.

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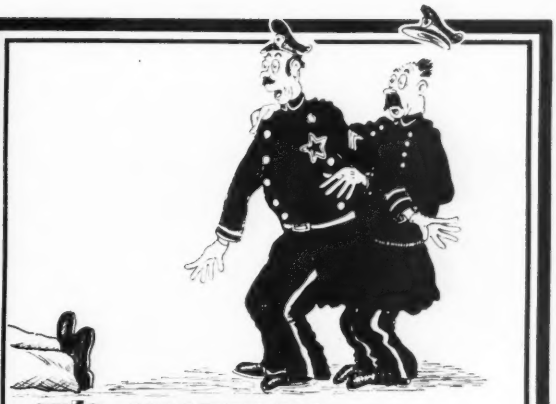

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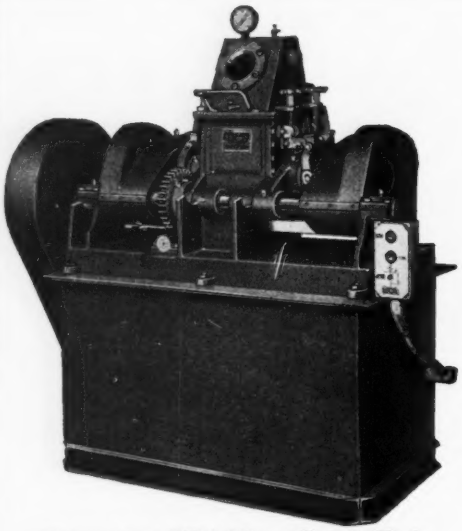

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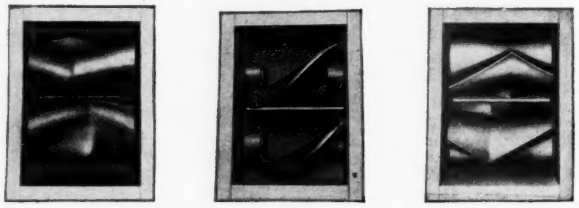

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Market Reviews

CRUDE RUBBER

Commodity Exchange

TABULATED WEEK-END CLOSING PRICES ON THE NEW YORK MARKET

Futures	July 27	Aug. 31	Sept. 7	Sept. 14	Sept. 21
		"New" Standard			
Sept.	19.29	19.07	19.18	19.00	19.01
Oct.	.....	19.10	19.18	18.98	19.00
Dec.	18.50	19.10	19.18	18.95	18.98
Mar.	18.30	18.95	19.00	18.78	18.80
July	.....	18.85	18.90	18.72	18.70
		No. 1 Standard			
Sept.	19.49	19.12	19.25	19.00	19.01
Oct.	.....	19.13	19.23	18.98	19.00
Dec.	18.65	19.15	19.21	18.95	18.98
Mar.	18.40	19.05	19.10	18.78	18.80
May	18.35	18.92	19.00	18.72	18.70
Volume (tons) per week					
"New" Standard	30	800	....	90	420
No. 1 Standard	2,440	8,070	2,250	3,530	2,880

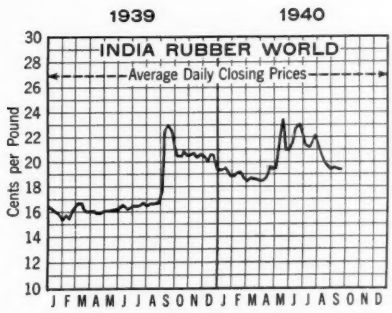
LARGER exports from producing countries, increased domestic stocks, and an upward revision in the export quota were leading developments in the rubber situation in September. In a month of quiet trading the rubber futures market ruled slightly easier; and October futures (old contract), after closing at 19.13¢ per pound on August 30, moved lower to close at 19¢ per pound September 21. Thereafter the market was stronger, and the closing price on September 28 was 19.55¢.

Following the example of the New York Commodity Exchange, the London market granted sellers the option of delivering rubber in bales or cases. This move was said to be welcomed by Far Eastern rubber circles, with the larger proportion of rubber now being packed in bales.

The International Rubber Regulation Committee on September 9 revised the rubber export quota for the fourth quarter of 1940 upward to 90% from the 85% previously set for the second half of 1940. This action, which adds 6,425 tons monthly to potential fourth quarter rubber supplies, was taken to expedite further accumulation of emergency rubber reserves both in this country and in England. Stocks of crude rubber in this country on August 31 were 212,774 tons; while afloats at that time totaled 141,286 tons, a new high. Stocks and afloats together total 354,060 tons, or approximately seven months' supply at the current rate of consumption.

Domestic crude rubber consumption during September held up well, and it is believed that the September total will be somewhat higher than the August figure of 50,477 long tons. In view of the defense program and anticipated activity in the automotive industry, consumption during the balance of this year should be well maintained. If consumption for the last four months of the year averages 50,000 tons monthly, as it has for the first eight months, the yearly consumption will set an all-time high record.

Imports have been arriving without interruption and in August set a new high record of 73,028 long tons; re-exports totaled 415 tons. Exports from agreement countries during July were 123,111 tons, the largest in the history of the regulation plan.



New York Outside Market—Spot Ribbed Smoked Sheets

New York Outside Market Rubber Quotations

Latex	Sept. 28, 1939	Aug. 27, 1940	Sept. 25, 1940
Normal, 38-40%, gal.	$0.76/0.77	$0.75/0.77	$0.74/0.75
Centrifuged, 60-63% ....gal.	.. ..	1.30/1.32	1.28/1.30
Paras			
Upriver fine....lb.	.18½	.17¾	.15¾
Upriver fine....lb.	*.21½	*.18⅛	*.18
Upriver coarse.lb.	.13	.10¼	.11
Upriver coarse.lb.	*.20	*.16	*.15¼
Islands fine....lb.	.18	.16½	.15
Islands fine....lb.	*.21	*.18	*.17½
Acre, Bolivian fine .....lb.	.19	.17½	.15¾
Acre, Bolivian fine .....lb.	*.22	*.19	*.18¾
Beni, Bolivian fine .....lb.	.20	.18¾	.17½
Madeira fine...lb.	.18¾	.17¼	.15½
Caucho			
Upper ball.....lb.	.13	.10¼	.11
Upper ball.....lb.	*.20	*.16	*.15¼
Lower ball.....lb.	.12	.10	.10
Pontianak			
Pressed block..lb.	.11/.18	.20/24	.19/.22
Guayule			
Ampar .....lb.	.13¼	.15½	.15½
Africans			
Rio Nuñez .. lb.	.18	.18½	.18½
Black Kassai...lb.	.18	.18½	.18½
Prime Niger flake .....lb.	.21	.22½	.22½
Gutta Percha			
Gutta Siak ....lb.	.14	.22	.19½
Gutta Soh .....lb.	.18	.30¾	.28
Red Macassar..lb.	1.20	1.20	1.20
Balata			
Block Ciudad Bolivar .....lb.	.33	.45	.45
Manaos block..lb.	.33	.55	.52
Surinam sheets.lb.	.43	.53	.48
Amber .....lb.	.45	.55	.50

* Washed and dried crepe. Shipments from Brazil.

New York Outside Market

Activity in the outside market was reported to be generally quiet during September, with offerings from the Far East limited and too high for the local market. There was a relatively good demand for crepe rubber. The market was steady, and the price of No. 1-X ribbed smoked sheets, packed in cases, which closed at 19⅜¢ per pound on August 30, advanced to 19⅝¢ per pound on September 4, where it remained until September 9. On September 10 the price dropped to 19⅜¢ per pound and held this level until September 21. The closing price on September 28 was 19¾¢ per pound, with the market stronger.

Rubber and Canvas Footwear Statistics

	Thousands of Pairs		
	Inventory	Production	Shipments
1938	16,183	50,812	54,942
1939	16,388	60,612	60,377
1940			
Jan.	15,018	5,044	6,389
Feb.	15,319	5,062	4,761
Mar.	15,656	4,869	4,532
Apr.	16,881	5,128	3,902
May	18,095	5,075	3,862
June	18,886	4,521	3,737
July	17,641	3,323	4,567

The above figures have been adjusted to represent 100% of the industry based on reports received which represented 81% for 1936-37.
Source: *Survey of Current Business*, Bureau of Foreign & Domestic Commerce, Washington, D. C.

New York Outside Market—Spot Closing Prices—Plantation Grades—Cents per Pound

	August, 1940						September, 1940														
	26	27	28	29	30	31†	2‡	3	4	5	6	7†	9	10	11	12	13	14	16	17	18	19	20	21
No. 1-X R.S.S. in cases*	19⅜	19⅜	19½	19¼	19⅜	..	..	19½	19⅜	19⅜	19⅜	..	19⅜	19½	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜
No. 1 Thin Latex Crepe	19⅜	19⅜	19¼	19	19¼	..	..	19⅜	19½	19½	19½	..	19½	19⅜	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼
No. 2 Thick Latex Crepe	19⅜	19⅜	19¼	19	19¼	..	..	19⅜	19½	19½	19½	..	19½	19⅜	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼
No. 1 Brown Crepe	18¼	18¼	18⅛	17⅞	18	..	..	18⅛	18¼	18¼	18¼	..	18¼	18⅛	18	18	18	18	18	18	18	18	18	18
No. 2 Brown Crepe	17⅞	17⅞	17¾	17½	17⅝	..	..	17¾	17⅞	17⅞	17⅞	..	17⅞	17¾	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝
No. 2 Amber	18¼	18¼	18⅛	17⅞	18	..	..	18⅛	18¼	18¼	18¼	..	18¼	18⅛	18	18	18	18	18	18	18	18	18	18
No. 3 Amber	17⅞	17⅞	17¾	17½	17⅝	..	..	17¾	17⅞	17⅞	17⅞	..	17⅞	17¾	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝
Rolled Brown	14⅛	14⅛	14	13¾	13⅞	..	..	14	14⅛	14⅝	14⅝	..	14⅝	14½	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜

*No. 1 Ribbed Smoked Sheets are ⅛¢ lower than No. 1-X R.S.S. in cases quoted here. †Closed. ‡Holiday.

RECLAIMED RUBBER

ACCORDING to R. M. A. figures, August reclaimed rubber consumption is estimated at 14,179 long tons, 0.8% below that of July; production, 17,213 long tons; and stocks on hand August 31, 29,832 long tons. Demand during September was reported somewhat better than that of August, with further increases in activity looked for in succeeding months. Tires and mechanical goods continue to be good outlets for reclaim.

The market is steady, and all grades of reclaim continue at last month's quotations.

New York Quotations

September 23, 1940

	Sp. Grav.	¢ per lb.
Auto Tire		
Black Select	1.16-1.18	6 / 6¼
Acid	1.18-1.22	7 / 7¼
Shoe		
Standard	1.56-1.60	6½/ 6¾
Tubes		
Red Tube	1.15-1.30	9 / 9¼
Compound	1.10-1.20	9 /10
Miscellaneous		
Mechanical Blends	1.25-1.50	4½/ 5
White	1.35-1.50	12½/14

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

RUBBER SCRAP

THE demand for scrap rubber during September showed a gain over the previous month. Increased activity in the automotive and rubber mechanical goods were said to be contributing causes in the better activity. The market in general is firm, with mixed tires, tire carcass, and peelings up in price, and all other grades unchanged.

Consumers' Buying Prices

(Carlot Lots for September 23, 1940)

Boots and Shoes	Prices
Boots and shoes, black....lb.	$0.01⅛/$0.01¼
Colored .....lb.	.00⅞/ .01
Untrimmed arctics .....lb.	.00⅞/ .01
Inner Tubes	
No. 1, floating.....lb.	.10 / .10½
No. 2, compound.....lb.	.04¾/ .04⅞
Red .....lb.	.04¼/ .04½
Mixed tubes .....lb.	.03⅞/ .04¼
Tires (Akron District)	
Pneumatic Standard	
Mixed auto tires with beads .....ton	15.00 /15.50
Beadless .....ton	18.50 /19.00
Auto tire carcass.....ton	38.00 /44.00
Black auto peelings.....ton	42.00 /44.00
Solid	
Clean mixed truck.....ton	30.00 /32.00
Light gravity .....ton	42.00 /44.00
Mechanicals	
Mixed black scrap.....ton	20.00 /22.00
Hose, air brake.....ton	18.00 /20.00
Garden, rubber covered.ton	10.00 /12.00
Steam and water, soft...ton	10.00 /12.00
No. 1 red .....lb.	.02¾/ .03
No. 2 red .....lb.	.02¼/ .02½
White druggists' sundries..lb.	.03¼/ .04
Mixed mechanicals .....lb.	.02¼/ .02½
White mechanicals.....lb.	.03¼/ .03½
Hard Rubber	
No. 1 hard rubber.....lb.	.11½/ .13

United States Reclaimed Rubber Statistics—Long Tons

Year	Production†	Consumption†	Consumption % of Crude	U.S. Stocks*†	Exports
1938	122,403	120,800	27.6	23,000	7,403
1939	186,000	170,000	28.7	25,250	12,611
1940					
Jan.	19,297	16,070	29.2	27,418	1,059
Feb.	17,992	15,370	30.8	28,602	1,436
Mar.	17,234	15,931	31.7	28,488	1,420
Apr.	16,568	16,298	32.5	27,558	977
May	17,552	15,719	30.5	28,397	866
June	16,631	14,912	32.1	29,260	1,207
July	14,342	14,298	30.4	28,058	1,244
Aug.	17,213	14,179	28.1	29,832	.....

*Stocks on hand the last of the month or year. †Corrected to 100% from estimate of reported coverage. *Compiled by The Rubber Manufacturers Association, Inc.*

IMPORTS, CONSUMPTION, AND STOCKS

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks—Long Tons

Twelve Months	U.S. Imports*	U.S. Consumption¶	U.S. Stocks Mfrs., Dealers, Importers, Etc.†¶	U.S. Stocks Afloat	U.K.—Public Warehouses, London, Liverpool†‡	Singapore and Penang Dealers and Port Stocks†‡	World Production (Net Exports)‡	World Consumption Estimated‡	World Stocks†‡§
1937	584,851	543,600	262,204	63,099	57,785	44,792	1,139,800	1,105,002	646,252
1938	400,178	437,031	231,500	45,105	86,853	27,084	894,900	942,252	596,498
1939	499,473	592,000	125,800	91,095	44,917*a*	15,299	1,004,429	1,110,358	447,666*a*
1940									
Jan	72,520	54,978	142,368*b*	90,285*b*	.....	35,928	108,622	105,970	.....
Feb.	43,088	49,832	134,328*b*	112,257*b*	.....	33,563	113,928	96,575	.....
Mar.	59,277	50,192	142,414*b*	113,619*b*	.....	23,830	112,240	102,288	.....
Apr.	70,699	50,103	162,459*b*	102,557*b*	.....	42,239	88,286	100,363	.....
May	51,431	51,619	161,446*b*	109,364*b*	.....	32,721	122,837	94,264	.....
June	53,889	46,506	168,235*b*	119,138*b*	.....	32,411	111,006	80,051	.....
July	69,474	47,011	190,222*b*	139,629*b*	.....	36,750	127,585	75,556	.....
Aug.	73,028	50,477	212,774*b*	141,286*b*	.....	.....	.....	.....	.....

*Including liquid latex. †Stocks on hand the last of the month or year. ‡*Statistical Bulletin of the International Rubber Regulation Committee.* §Stocks at U. S. A., U. K., Singapore and Penang, Para, Manaos, regulated areas, and afloat. ¶Corrected to 100% from estimate of reported coverage. *a.* Stocks as of Aug. 31, 1939. *b.* Includes government barter rubber.

THE R. M. A. estimated that United States rubber manufacturers consumed 50,477 long tons of crude rubber during August, 7.4% over the July consumption of 47,011 long tons, but 2.4% below August, 1939, when 51,740 (revised) long tons were consumed.

Gross imports for August, as reported by the Department of Commerce, were 73,028 long tons, 5.1% over the July figure of 69,474 long tons and 89.3% over the 38,586 long tons for August, 1939.

Total domestic stocks on August 31 are estimated by the R. M. A. at 212,774 long tons, including 41,741 long tons of government emergency rubber, 11.9% over the 190,222 long tons on hand July 31 and 40% over the 152,029 (revised) long tons on hand August 31, 1939.

Crude rubber afloat to U. S. ports August 31 is estimated at 141,286 long tons, against 139,629 long tons on July 31 and 66,717 long tons afloat August 31, 1939.

Correction

In the announcement, "Government to Buy Added 180,000 Tons of Rubber in 1941," on page 49 of our September issue, the last sentence should be corrected to read: "Adding this to the 415,000 tons of agreement rubber, the total would be about 575,000 tons, or close to the present yearly U. S. rubber requirements of 600,000 tons."

Tire Production Statistics

	Pneumatic Casings		
	Inventory	Production	Shipments
1938	8,451,390	40,906,735	43,132,302
1939	8,664,505	57,612,731	57,508,775
1940			
Jan.	9,347,953	4,953,585	4,270,137
Feb.	10,123,824	4,888,250	4,112,379
Mar.	10,747,370	5,007,042	4,345,674
Apr.	10,881,029	5,105,953	5,009,762
May	10,576,217	5,415,314	5,720,249
June	8,881,101	5,147,871	6,926,553
July	9,299,014	4,706,525	4,314,799

	Pneumatic Casings		
	Original Equipment	Replacement Sales	Export Sales
1938	10,716,130	30,565,008	1,048,934
1939	18,207,556	38,022,034	1,279,185
1940			
Jan.	1,804,826	2,376,455	88,856
Feb.	1,974,466	2,051,487	86,426
Mar.	2,050,250	2,217,627	77,797
Apr.	2,095,220	2,823,293	91,249
May	1,998,735	3,635,652	85,862
June	1,925,420	4,918,341	82,792
July	857,684	3,377,166	79,949

	Inner Tubes		
	Inventory	Production	Shipments
1938	8,165,696	37,847,656	40,292,614
1939	7,035,671	50,648,556	51,190,314
1940			
Jan.	7,633,798	4,286,924	3,826,667
Feb.	7,896,960	4,210,904	3,809,733
Mar.	8,182,655	4,399,550	4,113,735
Apr.	8,258,331	4,618,361	4,542,735
May	8,243,050	4,739,072	4,738,668
June	6,841,281	4,359,486	5,721,096
July	7,093,996	4,027,495	3,792,962

Source: The Rubber Manufacturers Association, Inc. Figures adjusted to represent 100% of the industry.

COMPOUNDING INGREDIENTS

MOVEMENT of compounding ingredients into consumption during September was reported heavier than in August. The outlook for the balance of the year is favorable in view of anticipated activity in automotive production and for defense purposes.

CARBON BLACK. Shipments to rubber manufacturers were heavier during September than in the preceding month. Producers' inventories at the end of August were estimated to approximate 150,000,000 pounds, up 12,000,000 pounds from the end of July. Prices are steady.

The Department of Commerce reported that the Japanese Government has conducted experiments in the production of carbon black during recent years and that five small plants were erected in Formosa. Output, however, is below domestic demand. Recently the Natural Gas Institute of the Formosan Government-General built a pilot plant in Formosa which will utilize a thermal cracking process, reported to differ in many respects from processes used in the United States. Imports of carbon black into Japan, which still imports 80% of her carbon black needs, for the past three years follow: 1937, 10,067,900 kin, value 2,976,070 yen; 1938, 6,360,100 kin, value 1,769,002 yen; and 1939, 7,874,200 kin, value 2,117,726 yen.

FACTICE OR RUBBER SUBSTITUTE. The demand continued fair with prices unchanged.

LITHARGE. The demand was fair, and the price steady.

LITHOPONE. Withdrawals against contract were at a good level, and prices continue unchanged for last-quarter delivery.

RUBBER CHEMICALS. Sales were in excess of those of the preceding month. Prices are generally steady.

RUBBER SOLVENTS. Movement of solvent to tire makers was at an increased level. Prices are firm.

TITANIUM PIGMENTS. The demand throughout the rubber industry increased last month. Prices for the balance of the year continue unchanged.

ZINC OXIDE. The movement of zinc oxide to both the paint and the rubber industry continued heavy, and there was reported to be a persistent export demand from countries formerly supplied by Europe. The price of lead-free zinc oxides was advanced ¼¢ per pound, effective October 1.

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.03 / $.035
Rottenstone, domestic	lb.	.03 / .035
Silica, 15	ton	

Accelerators, Inorganic

Lime, hydrated, *l.c.l.*, New York	ton	20.00
Litharge (commercial)	lb.	.075

Accelerators, Organic

A-1	lb.	.24 / .30
A-10	lb.	.31 / .35
A-11	lb.	.52 / .65
A-19	lb.	.52 / .65
A-32	lb.	.70 / .80
A-77	lb.	.42 / .55
A-100	lb.	.42 / .55
Accelerator 49	lb.	.40 / .42
737	lb.	.42 / .43
737-50	lb.	.25 / .26
808	lb.	.70 / .72
833	lb.	1.15
Acrin	lb	.60
Aldehyde ammonia	lb.	.65 / .70
Altax	lb.	.55 / .60
B-J-F	lb.	.50 / .55
Beutene	lb.	.70 / .75
Butyl Eight	lb.	.98 / 1.00
Zimate	lb.	2.50
C-P-B	lb.	2.00
Captax	lb.	.50 / .55
Crylene	lb.	.40 / .47
Paste	lb.	.30 / .36
D-B-A	lb.	2.00
Delac A	lb.	.40 / .50
O	lb.	.40 / .50
P	lb.	.40 / .50
Di-Esterex-N	lb.	.60 / .70
DOTG (Di-ortho-tolyguanidine)	lb.	.44 / .46
DPG (Diphenylguanidine)	lb.	.35 / .45
El-Sixty	lb.	.50 / .65
Ethylideneaniline	lb.	.42 / .43
Ethyl Zimate	lb.	2.50
Formaldehyde P.A.C.	lb.	.06
Formaldehydeaniline	lb.	.31
Formaldehyde-para-toluidine	lb.	.52 / .54
Guantal	lb.	.40 / .50
Hepteen	lb.	.35 / .40
Base	lb.	1.35 / 1.50
Hexamethylenetetramine U.S.P.	lb.	.39
Technical	lb.	.33
Lead oleate, No. 999	lb.	.13
Witco	lb.	.15
Ledate	lb.	2.35
Monex	lb.	2.35
Novex	lb.	
O-N-V	lb.	1.00 / 1.10
O-X-A-F	lb.	$0.50 /$0.55
Ovac	lb.	.50 / .55
Para-nitroso-dimethylaniline	lb.	.85
Pentex	lb.	1.00 / 1.10
Flour	lb.	.15 / .16
Phenex	lb.	.50 / .55
Pip-Pip	lb.	2.50
Pipsolene	lb.	1.55 / 1.85
R-2	lb.	1.40 / 1.80
R-23	lb.	.40
R & H 50-D	lb.	.42 / .43
Rotax	lb.	.60 / .65
Safex	lb.	1.20 / 1.30
Santocure	lb.	.80 / 1.00
Selenac	lb.	2.75
SPDX	lb.	.70 / .75
A	lb.	.70 / .75
Super-sulphur No. 1	lb.	.50
2	lb.	.18 / .20
Tetrone A	lb.	2.70
Thiocarbanilide	lb.	.24 / .30
Thionex	lb.	2.35
Thiurad	lb	2.35
Trimene	lb.	55 / .65
Base	lb.	1.05 / 1.20
Triphenylguanidine (TPG)	lb.	.45
Tuads	lb.	2.35
Ulto	lb.	1.25 / 1.75
Ureka	lb.	.60 / .75
Blend B	lb.	.60 / .75
C	lb.	.56 / .65
Vulcanex	lb.	.42 / .43
Vulcanol	lb.	.85
Z-B-X	lb.	2.50
Zenite	lb.	.46 / .48
A	lb.	.53 / .55
B	lb.	.46 / .48
Zimate	lb.	2.35

Activators

Aero Ac 50	lb.	.46 / .56
Barak	lb.	.50
MODX	lb.	.30 / .35
SL No. 10	lb.	.12

Age Resisters

AgeRite Alba	lb.	1.50 / 1.65
Exel	lb.	1.00 / 1.02
Gel	lb.	.57 / .59
Hipar	lb.	.65 / .67
Powder	lb.	.52 / .54
AgeRite Resin	lb.	.52 / .54
D	lb.	.52 / .54
White	lb.	1.25 / 1.40
Akroflex C	lb.	.56 / .58
Albasan	lb.	.70 / .75
Aminox	lb.	.52 / .61
Antox	lb.	.56
B-L-E	lb.	$0.52 /$0.61
Powder	lb.	.65 / .74
B-X-A	lb.	.52 / .61
Copper Inhibitor X-872-A	lb.	1.15
Flectol B	lb.	.52 / .63
H	lb.	.52 / .63
White	lb.	.90 / 1.15
M-U-F	lb.	1.50
Neozone (standard)	lb.	.63
A	lb.	.52 / .54
B	lb.	.63
C	lb.	.52 / .54
D	lb.	.52 / .54
E	lb.	.63
Oxynone	lb.	.64 / .80
Parazone	lb.	.68
Permalux	lb.	1.20
Santoflex B	lb.	.52 / .65
Solux	lb.	1.30
Stabilite	lb.	.52 / .54
Alba	lb.	.70 / .75
Thermoflex A	lb.	.65 / .67
Tysonite	lb.	.16
V-G-B	lb.	.52 / .61

Alkalies

Caustic soda, flake, Columbia (400-*lb. drums*)	100 *lbs.*	2.70 / 3.55
liquid, 50%	100 *lbs.*	1.95
solid (700-*lb. drums*)	100 *lbs.*	2.30 / 3.15

Antiscorch Materials

A-F-B	lb.	.35 / .40
Antiscorch T	lb.	.90
Cumar RH	lb.	.10
E-S-E-N	lb.	.35 / .40
R-17 Resin (*drums*)	lb.	.10
RM	lb.	1.25
Retarder W	lb.	.36
Retardex	lb.	.45 / .48
U-T-B	lb.	.35 / .40

Antisun Materials

Heliozone	lb.	.22 / .23
S.C.R.	lb.	.33 / .35
Sunproof	lb.	.22 / .27

Brake Lining Saturant

B.R.T. No. 3	lb.	.0165/ .0175

Colors

Black

Du Pont powder	lb.	.42 / .44
Lampblack (commercial), *l.c.l.*	lb.	.15

Blue

Brilliant	lb.	
Du Pont dispersed	lb.	.83 / 3.95
Powders	lb.	2.25 / 3.75
Toners	lb.	.08 / 3.85

Brown

Mapico	lb.	.11

Green

Brilliant	lb.	
Chrome, light	lb.	
medium	lb.	.22
oxide (*freight allowed*)	lb.	
Dark	lb.	
Du Pont dispersed	lb.	.98 / 1.75
Powders	lb.	1.00 / 5.50
Guignet's (*bbls.*)	lb.	.70
Light	lb.	
Toners	lb.	.85 / 3.75

Orange

Du Pont dispersed	lb.	.88 / .98
Powders	lb.	.88 / 2.75
Lake	lb.	
Toners	lb.	.40 / 1.60

Orchid

Toners	lb.	1.50 / 2.00

Pink

Toners	lb.	1.50 / 2.00

Purple

Permanent	lb.	
Toners	lb.	.60 / 2.10

Red

Antimony Crimson, 15/17%	lb.	
R. M. P. No. 3	lb.	.48
Sulphur free	lb.	
R.M.P.	lb.	.52
Golden 15/17%	lb.	
7-A	lb.	.37
Z-2	lb.	.23
Cadmium, light (400-*lb. bbls.*)	lb.	.75 / .80
Chinese	lb.	
Crimson	lb.	
Du Pont dispersed	lb.	.93 / 2.05
Powders	lb.	.285 / .90
Mapico	lb.	.0925
Medium	lb.	
Rub-Er-Red (*bbls.*)	lb.	.0925
Scarlet	lb.	.08 / 2.00
Toners	lb.	.08 / 2.00

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing all known ingredients. Requests for information not recorded will receive prompt attention.

White

Lithopone (*bags*)	lb.	$0.0360/$0.0385
Albalith	lb.	.0360/ .0385
Astrolith (50-*lb. bags*)	lb.	.0360/ .0385
Azolith	lb.	.0360/ .0385
Titanium Pigments		
Ray-Bar	lb.	.0525/ .0575
Ray-Cal	lb.	.05 / .0525
Rayox	lb.	.13
Titanolith (50-*lb. bags*)	lb.	.05 / .0525
Titanox-A (50-*lb. bags*)	lb.	.13 / 1375
B (50-*lb. bags*)	lb.	.0525/ .0550
30 (50-*lb. bags*)	lb.	.0525/ .0550
C (50-*lb. bags*)	lb.	.05 / .0525
M (50-*lb. bags*)	lb.	.0525/ .0550
Ti-Tone	lb.	
Zopaque (50-*lb. bags*)	lb.	.13 / .135
Zinc Oxide		
Azo ZZZ-11	lb.	.0625/ .0650
44	lb.	.0625/ .0650
55	lb.	.0625/ .0650
66	lb.	.0625/ .0650
French Process, Florence		
Green Seal-8	lb.	.0825/ .0850
Red Seal-9	lb.	.0775/ .08
White Seal-7	lb.	.0875/ .09
Kadox, Black Label-15	lb.	.065 / .0675
No. 25	lb.	.0775/ .08
Red Label-17	lb.	.065 / .0675
Horse Head Special 3	lb.	.065 / .0675
XX Red-4	lb.	.065 / .0675
23	lb.	.065 / .0675
72	lb.	.065 / .0675
78	lb.	.0625/ .065
80	lb.	.065 / .0675
103	lb.	.065 / .0675
110	lb.	.065 / .0675
St. Joe (lead free)		
Black Label	lb.	.0625/ .065
Green Label	lb.	.0625/ .065
Red Label	lb.	.0625/ .065
U.S.P.	lb.	.0975/ .10
White Jack	lb.	.075 / .0775
Zinc Sulphide Pigments		
Cryptone-BA-19	lb.	.05 / .0525
BT	lb.	.05 / .0525
CB	lb.	.05 / .0525
MS	lb	.0525/ .055
ZS No. 20	lb.	.075 / .0775
86	lb.	.075 / .0775
230	lb.	.075 / .0775
800	lb.	
Sunolith	lb.	.0360/ .0385

Yellow

Cadmolith (cadmium yellow), (400-*lb. bbls.*)	lb.	.50 / .55
Du Pont dispersed	lb.	1.25 / 1.75
Powders	lb.	.135 / 2.75
Lemon	lb.	
Mapico	lb.	.0675
Toners	lb.	2.50

Dispersing Agents

Bardex	lb.	.0395/ .042
Bardol	lb.	.0225/ .025
Darvan	lb.	.30 / .39
Nevoll (*drums, c.l.*)	lb.	.0225
Santomerse S	lb.	.11 / .25

Fillers, Inert

Asbestine, *c.l.*	ton	15.00
Barytes	ton	30.00 /36.00
f.o.b., St. Louis (50-*lb. paper bags*)	ton	22.85
off color, domestic	ton	21.50 /26.50
white, imported	ton	
Blanc fixe, dry, precip.	lb.	.03 / .035
Calcene	ton	37.50 /43.00
Infusorial earth	lb.	.025 / .03
Kalite No. 1	ton	24.00 /30.00
3	ton	34.00 /40.00
Kalvan	ton	121.00
Magnesia, calcined, heavy	lb.	.04
Carbonate, *l.c.l.*	lb.	.0725/ .095
Paradene No. 2 (*drums*)	lb.	.045
Pyrax A	ton	6.00 /20.00
Whiting		
Columbia Filler	ton	9.00 /14.00
Suprex, white extra light	ton	45.00
heavy	ton	45.00
Witco, *c.l.*	ton	6.00

Finishes

Rubber lacquer, clear	gal.	
colored	gal.	
Starch, corn, pwd.	100 lbs.	
potato	lb.	
Talc	ton	.025 / .035

Flock

Cotton flock, dark	lb.	.10 / .12
dyed	lb.	.40 / .80
white	lb.	.11 / .18
Rayon flock, colored	lb.	.75 / 1.50
white	lb.	.75 / .85

Latex Compounding Ingredients

Accelerator 85	lb.	.35
89	lb.	1.40
122	lb.	1.55
552	lb.	2.50
Aerosol OT Aqueous 10%	lb.	.15 / .175
Antox, dispersed	lb.	.42
Aquarex A	lb.	$0.35
D	lb.	.75
F	lb.	.85
WA Paste	lb.	.28
Areskap No. 50	lb.	.18 /$0.24
100, dry	lb.	.39 / .51
Aresket No. 240	lb.	.16 / .22
300, dry	lb.	.42 / .50
Aresklene No. 375	lb.	.35 / .50
400, dry	lb.	.51 / .65
Black No. 25, dispersed	lb.	.22 / .40
Collocarb	lb.	.07
Color Pastes, dispersed	lb.	.35 / 1.90
Compound G-11 NW	lb.	
Dispersex No. 15	lb.	.11 / .12
No. 20	lb.	.08 / .10
Emo, brown	lb.	
white	lb.	
Factice Compound, dispersed	lb.	.19
Heliozone, dispersed	lb.	.25
Igepon A	lb.	
Latac	lb.	
MICRONEX, Colloidal	lb.	.055 / .0655
Nekal BX (dry)	lb.	
Pipsol X	lb.	3.05 / 3.55
R-2 Crystals	lb.	2.50 / 2.75
R-23	lb.	.40
RN-2	lb.	2.00 / 2.25
Crystals	lb.	2.00 / 2.25
S-1 (400-*lb. drums*)	lb.	.65
Santobrite Briquettes	lb.	.17 / .26
Powder	lb.	.16 / .26
Santomerse D	lb.	.41 / .65
S	lb.	.11 / .25
No. 1	lb.	.18 / .35
No. 2	lb.	.18 / .35
No. 3	lb.	.40 / .65
No. 3P	lb.	.29 / .45
Santovar A	lb.	1.15 / 1.40
Stablex A	lb.	.90 / 1.10
B	lb.	.65 / .90
C	lb.	.40 / .50
Sulphur, dispersed	lb.	.10 / .15
No. 2	lb.	.075
T-1 (400-*lb. drums*)	lb.	.40
Tepidone	lb.	1.20
Vulcan Colors	lb.	
Zinc oxide, dispersed	lb.	.12 / .15

Mineral Rubber

Black Diamond	ton	25.00
B.R.C. No. 20	lb.	.009 / .01
Hydrocarbon, hard	ton	23.00
Genasco Hydrocarbon, granulated	ton	
solid	ton	
Gilsonite	ton	
Parmr	ton	
Pioneer	ton	
285°-300°	ton	23.00 /42.00

Mold Lubricants

Lubrex	lb.	.25 / .30
Mold Paste	lb.	.12 / .18
Sericite	ton	65.00 /75.00
Soapbark	lb.	
Soapstone, *l.c.l.*	ton	25.00 /35.00

Oil Resistant

AXF	lb.	.40 / .50

Reclaiming Oils

B.R.V.	lb.	.032 / .0345
No. 1621	lb.	.019 / .02
S.R.O.	lb.	.019 / .02
X-159	gal.	.20

Reenforcers

Carbon Black		
Aerfloted Arrow Specification (*bags only*)	lb.	.02925†
Arrow Compact Granulized	lb.	.02925†
Certified Heavy Compressed (*bags only*)	lb.	.02925†
Spheron	lb.	.02925†
Continental, dustless	lb.	.02925†
Compressed (*bags only*)	lb.	.02925†
Disperso	lb.	.02925†
Dixie	lb.	.02925†
Dixiedensed	lb.	.02925†
66	lb.	.02925†
Excello, dustless	lb.	.02925†
Fumonex	lb.	.03
Gastex	lb.	.03 / .07
Kosmobile	lb.	.02925†
66	lb.	.02925†
Kosmos	lb.	.02925†
MICRONEX Beads	lb.	.02925†
Mark II	lb.	.02925†
Standard	lb.	.02925†
W-5	lb.	.02925†
W-6	lb.	.02925†
P-33	lb.	.0475 / .0725
Pelletex	lb.	.03 / .07
Supreme, dustless	lb.	.02925†
Thermax	lb.	.02 / .0475
Velvetex	lb.	.029 / .034
"WYEX BLACK"	lb.	.02925†

†Price quoted is f.o.b. works (bags). The price f.o.b. works (bulk) is 2.75¢ per pound; f.o.b. Hoboken (bulk), 3.63¢; f.o.b. No. Atlantic Docks (bags), 3.80¢. All prices are carlot.

Carbonex	lb.	$0.022 /$0.035
S	lb.	.03 / .0350
Clays		
Aerfloted Paragon (50-*lb. bags*)	ton	10.00
Suprex (50-*lb. bags*)	ton	10.00
Barden	ton	10.00
Catalpo, *c.l.*	ton	30.00
Chicora	ton	10.00
China	ton	
Crown	ton	10.00
Dixie	ton	10.00 /22.50
Hi-White	ton	10.00
Langford	ton	8.50
NcNamee	ton	10.00 /22.50
Par	ton	10.00
Paraforce, *c.l.*	ton	40.00
Witco, *c.l.*	ton	10.00
Cumar EX	lb.	.045
MH	lb.	.065 / .11
V	lb.	.09 / .12
Silene	lb.	.04 / .045

Reodorants

Amora A	lb.	
B	lb.	
C	lb.	
D	lb.	
Compound G-4	lb.	
G-11	lb.	
Curodex 19	lb.	2.75
188	lb.	3.50
Para-Dors	lb.	4.50
Rodo No. 0	lb.	3.50 / 4.00
10	lb.	4.50 / 5.00
198	lb.	

Rubber Substitutes

Black	lb.	.08 / .12
Brown	lb.	.08 / .115
White	lb.	.085 / .135
Factice		
Amberex	lb.	.25
Type B	lb.	.1875
Brown	lb.	.08 / .13
Fac-Cel B	lb.	.13
C	lb.	.13
Neophax A	lb.	.09
B	lb.	.089
White	lb.	.085 / .125

Softeners

B.R.T. No. 7	lb.	.0165/ .0175
Bondogen	lb.	.98 / 1.25
Burgundy pitch	lb.	.06
Cycline oil	gal.	.14 / .20
Dispersing Oil No. 10	lb.	.0335/ .036
Nuba resinous pitch (*drums*)		
Grades No. 1 and No. 2	lb.	.0265
Nubalene Resin	lb.	.025
Palm oil (Witco), *c.l.*	lb.	
Palmol	lb.	
Para Flux	gal.	.17 / .18
No. 2016	gal.	.15 / .20
Para Lube	lb	.425 / .48
Pine tar	gal.	
Plastogen	lb.	.0775/ .10
Plastone	lb.	.27 / .30
R-19 Resin (*drums*)	lb.	.10
21 Resin (*drums*)	lb.	.10
Reogen	lb.	.115 / .22
Rosin oil, compounded	gal.	.40
RPA No. 1	lb.	.65
2	lb.	.65
3	lb.	.46
Rubtack	lb.	.10
Tackol	lb.	.083 / .18
Tonox	lb.	.52 / .61
Tonox D	lb.	.75 / .85
Witco No. 20, *l.c.l.*	gal.	.20
X-1 resinous oil (*tank car*)	lb.	.01

Softeners for Hard Rubber Compounding

Resin C. Pitch 45°C. M.P.	lb.	.013 / .014
60°C. M.P.	lb.	.013 / .014
75°C. M.P.	lb.	.013 / .014

Solvents

Beta-Trichlorethane	gal.	
Carbon bisulphide	lb.	
tetrachloride	lb.	
Cosol No. 1	gal.	.25 / .30
No. 2	gal.	.20 / .28
No. 3	gal.	.20 / .28
Industrial 90% benzol (*tank car*)	gal.	.14
Skellysolve	gal.	

Stabilizers for Cure

Laurex (*bags*)	lb.	.1025/ .1275
Stearex B	lb.	.085 / .095
Beads	lb.	.08 / .09
Stearic acid, single pressed	lb.	.085 / .095
Stearite, *c.l.*	100 lbs.	8.00
Zinc stearate	lb.	.23 / .25

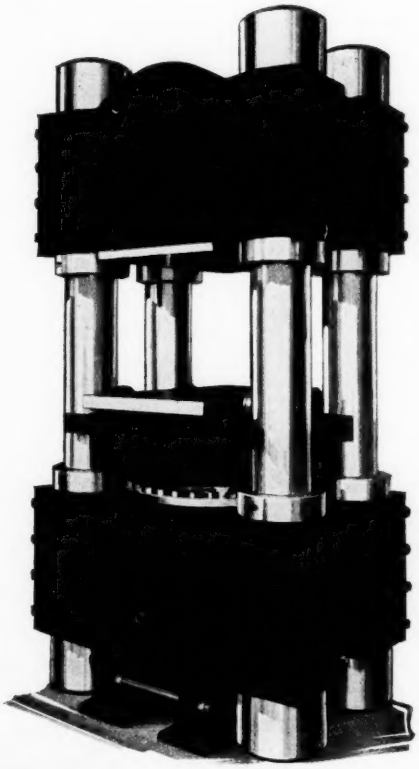
Synthetic Rubber

Neoprene Type E	lb.	.65
G	lb.	.70
GN	lb.	
GW	lb.	.75
H	lb.	.78
M	lb.	.65
Latex Type 57	lb.	.30
Synthetic 190	lb.	.55

(*Continued on page* 89)

SIZE Means Nothing!

ERIE ENGINEERS are prepared to consult with you on your requirements and to design the correct plastic and rubber working hydraulic presses regardless of size . . . 40 years experience in designing and building for the rubber and plastic industry is yours.



Erie Hydraulic Press with 40" ram and 36" x 52" platen with 36" opening.

ERIE

ERIE FOUNDRY COMPANY • ERIE, PA

Regular and Special Constructions of

COTTON FABRICS

Single Filling **Double Filling**

and

ARMY

Ducks

HOSE and BELTING

Ducks

Drills

Selected

Osnaburgs

Curran & Barry

320 BROADWAY

NEW YORK

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	July 27	Aug. 31	Sept. 7	Sept. 14	Sept. 21
Sept.	9.39	9.36	9.30	....	....
Oct.	....	9.29	9.23	9.31	9.46
Dec.	9.26	9.25	9.21	9.25	9.44
Mar.	9.03	9.06	9.02	9.11	9.34
July	8.67	9.68	9.62	8.72	8.96

New York Quotations

September 23, 1940

Drills	
38-inch 2.00-yard ..... *yd.*	$0.11
40-inch 3.47-yard	.07
50-inch 1.52-yard	.15⅜
52-inch 1.85-yard	.13¼
52-inch 1.90-yard	.12⅝
52-inch 2.20-yard	.11¼
52-inch 2.50-yard	.09⅞
59-inch 1.85-yard	.13
Ducks	
38-inch 2.00-yard D. F..... *yd.*	.10¾/.12½
40-inch 1.45-yard S. F.....	.16¼
51½-inch 1.35-yard D. F.....	.18½
72-inch 1.05-yard D. F.....	.26¼/.27
72-inch 17.21-ounce	.30⅞
Mechanicals	
Hose and belting ..... *lb.*	.25½
Tennis	
52-inch 1.35-yard ..... *yd.*	.17
Hollands	
Gold Seal and Eagle	
20-inch No. 72..... *yd.*	.10
30-inch No. 72.....	.18
40-inch No. 72.....	.20
50-inch No. 72.....	.28
Red Seal and Cardinal	
20-inch ..... *yd.*	.08½
30-inch	.15¾
40-inch	.17
50-inch	.26
Osnaburgs	
40-inch 2.34-yard..... *yd.*	.09⅝
40-inch 2.48-yard	.09⅛
40-inch 2.56-yard	.08⅜
40-inch 3.00-yard	.07⅜
40-inch 7-ounce part waste.....	.08
40-inch 10-ounce part waste.....	.10¾
37-inch 2.42-yard	.09⅜
Raincoat Fabrics	
Cotton	
Bombazine 60 x 64..... *yd.*	.08
Plaids 60 x 48.....	.11½
Surface prints 60 x 64.....	.12½
Print cloth, 38½-inch, 60 x 64.	.05
Sheetings, 40-Inch	
48 x 48, 2.50-yard..... *yd.*	.07¾
64 x 68, 3.15-yard.....	.07¾
56 x 60, 3.60-yard.....	.06⅞
44 x 40, 4.25-yard.....	.05
Sheetings, 36-Inch	
48 x 48, 5.00-yard..... *yd.*	.04½
44 x 40, 6.15-yard.....	.03¾
Tire Fabrics	
Bulider	
17¼ ounce 60" 23/11 ply Karded peeler ..... *lb.*	.29
Chafer	
14 ounce 60" 20/8 ply Karded peeler ..... *lb.*	.28½
9¼ ounce 60" 10/2 ply Karded peeler ..... *lb.*	.28
Cord Fabrics	
23/5/3 Karded peeler, 1/16" cotton ..... *lb.*	.29½
15/3/3 Karded peeler, 1/16" cotton ..... *lb.*	.27½
12/4/2 Karded peeler, 1/16" cotton ..... *lb.*	.26½
23/5/3 Karded peeler, 1¼" cotton ..... *lb.*	.35
23/5/3 Combed Egyptian.... *lb.*	.48½
Leno Breaker	
8¼ ounce and 10¼ ounce 60" Karded peeler ..... *lb.*	.31

COTTON futures prices during September strengthened somewhat; while the spot position ruled steady. The New York 1 1/16-inch spot middling price, after closing at 9.89¢ per pound on August 29, moved within relatively narrow limits throughout September and closed at 9.90¢ per pound on September 21, one point above the August 29 price. Thereafter the market was stronger, and the closing price on September 28 was 9.97¢ per pound.

Production of cotton from the crop of 1940 was estimated by the Crop Reporting Board of the Department of Agriculture as of September 1 to be 12,772,000 bales, up 1,343,000 bales from the August 1 estimate of 11,429,000 bales. In obtaining the September 1 figure, an indicated yield per acre of 250.7 pounds was used, the second highest on record.

According to the Bureau of Census, 654,503 bales of cotton were consumed by domestic mills during August, a new high record for that month. This figure compares with 597,850 bales in July and with 630,667 bales in August, 1939. Exports of cotton in August amounted to 65,000 bales, against 137,000 bales in July and 215,000 bales in August, 1939. Exports to Japan and the United Kingdom during August showed a sharp decrease, and no cotton was exported to Continental Europe.

In reporting on distribution prospects for the new season, the Department of Agriculture called the domestic consumption outlook favorable with expected increased purchasing power, government war buying, and the textile export subsidy. However it was predicted that raw cotton exports would be the poorest since immediately after the Civil War. A substantial rise in the domestic carryover, 10,500,000 bales on August 1, was looked for on the basis of current production and consumption predictions.

Fabrics

The market for fabrics of coarse yarn construction turned very active during September, particularly in regard to special construction fabrics capable of being adapted to military purposes. Contracting for special constructions is said to have absorbed production activities for the next seven weeks. The present condition of the market is believed to be sounder than a year ago when the European war started, and a continued broadening of demand is anticipated for the balance of this year.

The market is generally steady with quotations showing a mixed trend; tire fabrics are all down 1¢ per pound; hollands are steady; raincoat fabrics have advanced; while other fabrics show a mixed trend, but are mainly firm.

Statement of INDIA RUBBER WORLD

Statement of the ownership, management, circulation, etc., required by the Acts of Congress of August 24, 1912, and March 3, 1933, of INDIA RUBBER WORLD, published monthly at New York, N. Y., for October 1, 1940.

State of New York } ss.
County of New York }

Before me, a notary public in and for the State and county aforesaid, personally appeared S. C. Stillwagon, who, having been duly sworn according to law, deposes and says that he is the Editor of INDIA RUBBER WORLD and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and, if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse side of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are; publisher, Bill Brothers Publishing Corp., 420 Lexington Ave., New York, N. Y., editor, S. C. Stillwagon, 420 Lexington Ave., New York, N. Y.; managing editor, S. C. Stillwagon, 420 Lexington Ave., New York, N. Y.; business manager, B. B. Wilson, 420 Lexington Ave., New York, N. Y.

2. That the owner is: Bill Brothers Publishing Corp., Caroline L. Bill, Raymond Bill, Edward Lyman Bill, Randolph Brown, all of 420 Lexington Ave., New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1% or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders, as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

S. C. STILLWAGON,
Editor

Sworn to and subscribed before me this 25th day of September, 1940.
[SEAL]

WM. A. LOW.
Notary Public Queens Co. No. 3180. Reg. No. 7501. Certificate filed in N. Y. Co. No. 825. Reg. No. 1L486.
(Commission expires March 30, 1941)

U. S. Crude and Waste Rubber Imports for 1940

	Plantations	Latex	Paras	Africans	Centrals	Guayule	Totals 1940	Totals 1939	Balata	Miscellaneous	Waste
Jan. .....*tons*	68,856	2,768	406	161	74	255	72,520	37,082	107	648	241
Feb.	40,388	1,458	553	453	30	256	43,088	31,038	75	316	34
Mar.	56,027	2,720	119	49	42	320	59,277	45,724	89	659	26
Apr.	66,688	3,219	374	97	12	309	70,699	32,031	63	581	8
May	47,321	2,883	729	186	24	288	51,431	45,886	150	596	204
June	50,785	2,365	267	146	1	325	53,889	34,363	83	494	20
July	66,955	1,586	494	139	54	246	69,474	37,372	152	345	7
Aug.	70,102	2,038	282	206	73	327	73,028	38,586	52	834	107
Total 8 mos., 1940 .....*tons*	467,072	19,037	3,224	1,437	310	2,326	493,406	.....	771	4,473	647
Total 8 mos., 1939 .....*tons*	280,919	14,080	2,978	2,302	29	1,774	.....	302,082	481	5,501	961

Compiled from The Rubber Manufacturers Association, Inc., statistics.

Patents and Trade Marks

MACHINERY

United States

2,210,160. **Tank and System to Store Latex.** C. L. Beal, Cuyahoga Falls, assignor to American Anode, Inc., Akron, both in O.

2,210,284. **Control System** for Hydraulic Presses. R. W. Dinzl, Westfield, assignor to Watson-Stillman Co., Roselle, both in N. J.

2,210,883. **Machine to Make Single-Covered Balanced Elastic Yarn.** F. D. Chittenden, Rumford, and H. Manchester, Providence, both in R. I., assignors to United States Rubber Co., New York, N. Y.

2,211,008. **Hose Coupling Attaching Apparatus.** M. J. Goldberg, Philadelphia, Pa.

2,211,051. **Rubber Bale Cutter.** S. Bolling, Cleveland, O.

2,211,935. **Automatic Tire Inflator.** C. W. Parker, Dobbs Ferry, N. Y.

2,213,145. **Machine to Knit Elastic Top Stockings and Method of Knitting Them Thereon.** H. McAdams, assignor to Nolde & Horst Co., both of Reading, Pa.

2,213,150. **Rubber Garment and Form for Making It.** A. N. Spánel, Dover, Del.

2,213,303. **Rotable Barrel-Type Drier** for Rubber Articles. J. E. Cady, Indianapolis, Ind., assignor to United States Rubber Co., New York, N. Y.

2,213,721. **Rotary-Knife Apparatus to Slit Rubber Articles.** J. F. Skold, assignor to C. E. Zimmerman, both of Chicago, Ill.

Dominion of Canada

390,628. **Confining Medium for Hose** during Vulcanization, Comprising a Metallic Ribbon, A. L. Wallace, Northport, N. Y., U. S. A.

390,629. **Molding Apparatus Strip Guide.** A. L. Wallace, Northport, N. Y., U. S. A.

390,936. **Continuous Vulcanizer.** Boston Woven Hose & Rubber Co., Cambridge, assignee of T. M. Knowland, Belmont, both in Mass., U. S. A.

391,112. **Tire Vulcanizing Press,** with Mold Stripping Device. McNeil Machine & Engineering Co., assignee of O. J. Kuhlke, both of Akron, O., U. S. A.

United Kingdom

522,424. **Apparatus for and Manufacture of Pneumatic Tires.** Dunlop Rubber Co., Ltd., H. Willshaw, and H. Taylor.

522,543. **Vulcanizers** to Repair Tires and Other Rubber Articles. L. Steiner.

522,631. **Hydraulic Presses.** E. W. Bliss Co.

523,213. **Strip Guide** for Molding Apparatus. A. L. Wallace.

523,401. **Molding Method and Apparatus Therefor.** Dunlop Rubber Co., Ltd., and H. Willshaw.

523,599. **Guards for Presses.** Hydraulic Engineering Co., Ltd., and N. B. Ellington.

523,600. **Control of Hydraulic or Other Fluid-Pressure-Operated Presses.** J. E. Mills, R. G. Mills, J. Davies-Jenkins, and T. F. Owen.

523,690. **Rubber Molding Presses.** Ebonite Container Co., Ltd., and S. H. Woods.

PROCESS

United States

2,210,000. **Continuous Process of Manufacturing Cellular Rubber Strips.** F. W. Peel, Bedford, Va., assignor to Rubatex Products, Inc., New York, N. Y.

2,210,070. **Flexible Rubber-Metal Cylinder.** C. Field, Brooklyn, N. Y., assignor to Flakice Corp., Wilmington, Del.

2,210,075. **Knitting Ornamented Fabric** Having Elastic Thread Incorporated Therein. J. L. Getaz, New York, N. Y.

2,210,884. **Elastic Yarn.** F. D. Chittenden, Rumford, and K. J. Rupprecht, Barrington, both in R. I., assignors to United States Rubber Co., New York, N. Y.

2,210,954. **Tennis Balls.** F. T. Roberts, Malone, N. Y., assignor to A. H. Bates, Shaker Heights, O.

2,211,028. **Hollow Elastic Balls.** (Latex.) F. T. Roberts, Los Angeles, Calif., assignor to A. H. Bates, Shaker Heights, O.

2,211,143. **Laminated Elastic Fabric Panel.** P. L. Mahoney, Jackson Heights, assignor, by mesne assignments, to United States Rubber Co., New York,, both in N. Y.

2,211,228. **Knitting Elastic Tubes.** E. Fleer, Fond du Lac, Wis.

2,211,324. **Packaging Bare Rubber Thread.** B. H. Foster, Maplewood, N. J., and K. J. Rupprecht, Barrington, R. I., assignors by mesne assignments, to United States Rubber Co., New York, N. Y.

2,211,670. **Inflated Ball.** M. B. Reach, Springfield, Mass.

2,213,028. **One-Piece Tire.** H. T. Kraft, assignor to General Tire & Rubber Co., both of Akron, O.

2,213,113. **Testing Thin Rubber Articles.** A. M. Youngs, assignor to Youngs Rubber Corp. of N. J., both of Trenton, N. J.

2,213,144. **Elastic Top Stocking.** H. McAdams, assignor to Nolde & Horst Co., both of Reading, Pa.

2,213,479. **Game Ball.** W. J. Voit, Los Angeles, and L. C. Weimer, South Gate, both in Calif.; Weimer assignor to Voit.

2,213,545. **Attaching Rubber Trim to Fabric Shoe Parts.** C. H. Chace, Warwick Neck, A. B. Lingley, Cranston, and P. J. McCarthy, Bristol, assignors to Goodyear Footwear Corp., Providence, all in R. I.

2,213,659. **Composite Rubber Thread** from Two Bands of Rubber. G. Vincke, assignor to H. H. Straus, both of New York, N. Y.

2,213,899. **Laminated Elastic Foundation Garment Fabric.** F. G. Brown and D. J. Sullivan, Fairfield, Conn., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Dominion of Canada

390,935. **Endless Belt Curing Process.** Boston Woven Hose & Rubber Co., Cambridge, assignee of J. M. Bierer, Waban, both in Mass., U. S. A.

390,999. **Tire Manufacture** Including Arrangement of Cords of Fabric in Building the Tire. Wingfoot Corp., Wilmington, Del., assignee of R. B. Day, Akron, O., both in the U. S. A.

United Kingdom

522,452. **Cord Construction** in Manufacturing Tires. Fisk Rubber Corp.

522,521. **Tire Vulcanization.** Fisk Rubber Corp.

522,568. **Adhesion of Rubber** or the Like to Textile Materials. Dunlop Rubber Co., Ltd., D. F. Twiss, R. M. Everett, and F. A. Jones.

522,683. **Lining Rubber Articles.** International Latex Processes, Ltd., J. Rogerson, and F. W. Warren.

523,152. **Composite Fabrics of or Containing Rubber or the Like, and Bonding-Agents Therefor.** Dunlop Rubber Co., Ltd., and J. Haworth.

523,626. **Balls for Games.** Dunlop Rubber Co., Ltd., D. F. Twiss, and A. E. T. Neale.

523,734. **Production of Compositions of or Containing Rubber and the Like, and Articles Produced Therefrom.** Dunlop Rubber Co., Ltd., D. F. Twiss, and F. A. Jones.

CHEMICAL

United States

2,209,965. **Coating Composition** for Thin Flexible Sheet Containing a Rubber Isomer. T. G. Finzel, Kenmore, N. Y., assignor, by mesne assignments, to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,210,434. **Film-Forming Composition** Containing Softened Chlorinated Rubber or Polyvinyl Chloride. (Synthetic.) L. Rosenthal and W. Becker, Leverkusen I. G.-Werk, assignors to I. G. Farbenindustrie A. G., Frankfort a.M., all in Germany.

2,211,032. **Emulsion Polymerization of Butadienes** in Presence of Catalytic Amounts of Organic Base Containing at Least One Nitro Group. (Synthetic.) R. Seidler, Heidelberg, and W. Pannwitz, Merseburg, both in Germany, assignors, by mesne assignments, to Jasco, Inc., a corporation of La.

2,211,048. **Homogeneous Reaction Product** of Rubber and a Heat-Hardening Phenol-Formaldehyde Condensation Product. F. Bitterich, Hannover, Germany, assignor to Reichhold Chemicals, Inc., Detroit, Mich.

2,211,144. **Antioxidant**—A Perimidine Compound. W. E. Messer, Cheshire, Conn., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,211,429. **Shaped Elastic Masses** Comprising a Cellular and Comminuted Hardened Resin (Urea, Phenol Aldehyde, or Polyvinyl) with a Binder of Natural Rubber, Polymerized Butadiene, Hydrogenated Rubber, or Polyisobutylene, Etc. (Synthetic.) M. Mueller-Cunradi and W. Daniel, Ludwigshafen-on-the-Rhine, Germany, assignors, by mesne assignments, to Jasco, Inc., a corporation of La.

2,211,510. **Rubber Filler**—Soap-Protected Particles of Inert Material Containing 0.001 to 1.5% Manganese. H. D. Meincke, Glencoe, Ill.

2,211,593. **Reclaiming Vulcanized Rubber** by Masticating the Comminuted Vulcanizate in the Presence of a Rubber Accelerator at a Temperature below 180° F. A. D. Castello, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,211,608. **Electrical Insulation** Comprising Polychloroprene, an Oxide of Lead, and not over 12% Carbon Black. (Synthetic.) M. M. Safford, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,211,616. **Vulcanizing Rubber** in the Presence of a Basic Nitrogen-Containing Accelerator and Benzothiazyl 1-Thio Methylene Acetate. A. M. Clifford, Stow, O., assignor to Wingfoot Corp., Wilmington, Del.

2,211,623. **Accelerator**—Alpha-(2-Arylthiazylmercapto) Cyclohexanone. J. G. Lichty, Stow, O., assignor to Wingfoot Corp., Wilmington, Del.

2,211,629. **Antioxidant**—A Terpene-Ketone-Anil. W. Scott, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

2,211,632. **Accelerator**—A Thiuronium Dithiocarboxylate. G. W. Watt, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

2,211,945. **Bonding Artificial Cellulosic Material to Rubber,** Using Aqueous Solution of Polyvinyl Alcohol, an Aldehyde, and Material That Will React with Aldehyde to Form an Insoluble Infusible Resin. W. H. Charch, Buffalo, N. Y., assignor, by mesne assignments, to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,211,948. **Bonding Artificial Cellulosic Material to Rubber,** Using a Resin-Forming Aqueous Solution of an Amine and an Aldehyde. A. Hershberger, Kenmore, N. Y., assignor, by mesne assignments, to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,211,949. **Bonding Artificial Cellulosic Material to Rubber,** Using a Resin-Forming Aqueous Solution of a Cyanamide and an Aldehyde. A. Hershberger, Kenmore, N. Y., assignor by mesne assignments, to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,211,950. **Bonding Artificial Cellulosic Material to Rubber,** Using a Resin-Forming Aqueous Solution of a Ketone and an Aldehyde. A. Hershberger, Kenmore, N. Y., assignor by mesne assignments to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,211,951. **Bonding Artificial Cellulosic Material to Rubber,** Using Aqueous Solution of an Aldehyde, a Phenol, and Other Material That will react with the Aldehyde to form a Resin. A. Hershberger, Kenmore, N. Y., assignor by mesne assignments, to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,211,959. **Bonding Artificial Cellulosic Material to Rubber,** Using Resin-Forming Aqueous Solution of a Urea and an Aldehyde. D. B. Maney, Old Hickory, Tenn., assignor, by mesne assignments, to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,211,960. **Bonding Artificial Cellulosic Material to Rubber,** Using Aqueous Solution of an Amine-Phenol-Aldehyde Resin. F. M. Meigs, assignor, by mesne assignments, to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,211,964. **Bonding Artificial Cellulosic Material to Rubber,** Using Aqueous Solution of Deacetylated Chitin. A. P. Tanberg, assignor, by mesne assignments, to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,212,611. **Adhesive Composition Solution** of Plastic Polychloroprene Containing Zinc Chloride Double Salt of Phenyl Hydrazine. (Synthetic.) A. D. Macdonald, Malden, assignor to B. B. Chemical Co., Boston, both in Mass.

2,213,201. **Synthetic Composition**—a Copolymer of Styrene and, as a Plasticizing Agent, a Di-(Halophenyl-) Alkane. (Synthetic.) E. C. Britton and G. H. Coleman, assignors to Dow Chemical Co., all of Midland, Mich.

2,213,321. **Crude Rubber** with not More Than 0.12% Ash—Prepared by Creaming Acidified Formaldehyde-Preserved Latex and Mashing the Resulting Rubber Aggregate. J. McGavack, Leonia, and C. E. Linscott, Ridgewood, both in N. J., assignors to United States Rubber Co., New York, N. Y.

2,213,331. **Chlorinated Resin,** Prepared by Chlorinating the Reaction product of Isobutylene and Boron Fluoride. (Synthetic.) M. H. Arveson, assignor to Standard Oil Co., both of Chicago, Ill.

2,213,423. **Hydrocarbon Composition** Comprising a Rubber and a Copolymer of an Aliphatic Mono-Olefine and a Vinyl Compound. (Synthetic.) P. J. Wiezevich, Elizabeth, N. J. now by judicial change of name P. J. Gaylor, assignor to Standard Oil Development Co., a corporation of Del.

2,213,549. **Synthetic Rubber** from Gluten, Spirits of Turpentine, Sulphuric Acid, and Glycerine. J. C. Konow, Baltimore, Md.
2,213,751. **Transparent Rubbery Sheet** Comprising 100 Parts of a Polyvinyl Acetal Resin and at Least 40 Parts of Benzyl Maleate as Elasticizer. (Synthetic.) D. R. Swan, assignor to Eastman Kodak Co., both of Rochester, N. Y.
2,213,752. **Transparent Rubbery Sheet** Comprising 100 Parts of a Polyvinyl Acetal Resin and at Least 40 Parts of a Tetrahydrofurfuryl Ester of Phthalic Acid. (Synthetic.) D. R. Swan, assignor to Eastman Kodak Co., both of Rochester, N. Y.

Dominion of Canada

390,941. **Thermoplastic Derivatives of Rubber.** Canadian Industries, Ltd., Montreal, P. Q., assignee of I. Williams, Berger, Tex., U.S.A.
390,961. **Plasticized Polyvinyl Halide Compositions.** (Synthetic.) B. F. Goodrich Co., New York, N. Y., assignee of C. H. Alexander, Cuyahoga Falls, O., both in U. S. A.
390,962. **Protective Coating Composition** for Rubber Comprising a Mixture of Uncured Rubber and Neoprene. (Synthetic.) B. F. Goodrich Co., New York, N. Y., assignee of R. A. Crawford, Akron, O., both in the U. S. A.
390,967. **Chlorinated and Vulcanized Rubber Product** Containing not more than 20% Chlorine. Imperial Chemical Industries, Ltd., London, assignee of J. P. Baxter, Widnes, and L. T. Dod, Liverpool, co-inventors, all in England.
391,000. **Adhesive** for Binding Rubber to Artificial Silk in Tire Manufacture—Latex Emulsion in a Cement of a Rubber Derivative. Wingfoot Corp., Wilmington, Del., assignee of T. A. Riehl, Akron, O., both in the U. S. A.
391,001. **Antioxidant**—Reaction Product of an Amine and Diethylene Glycol. Wingfoot Corp., Wilmington, Del., assignee of A. F. Hardman, Akron, O., both in the U. S. A.
391,091. **Tire Bonding Plastic**—a Non-Curing Rubber Cement for Bonding a Coating of an Olefin Polysulphide Plastic to a Flexible Fabricated Base. (Synthetic.) Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of E. Eger, Grosse Pointe Park, Mich., U. S. A.

United Kingdom

522,659. **Stabilization of Rubber Hydrohalides.** Imperial Chemical Industries, Ltd.
522,665. **Polymerization of Butadienes-1,3.** (Synthetic.) A. Carpmael, (I. G. Farbenindustrie A.G.).
522,789. **Rubber-Like Polymerizates.** (Synthetic.) I. G. Farbenindustrie A. G.
522,818. **Olefin Polymerization.** (Synthetic.) Usines De Melle.
522,843, 522,844, and 522,845. **Compounding Rubber.** Wingfoot Corp.
522,981. **Polymerization Products.** Wingfoot Corp.
522,982. **Polymerization.** Wingfoot Corp.
522,983. **Vulcanization of Rubber.** Wingfoot Corp.
523,037. **Production and Use of Rubber Accelerators.** Monsanto Chemical Co.
523,110. **Covering Objects** with a Foil of Polyvinyl Chloride. (Synthetic.) I. G. Farbenindustrie A. G.
523,130. **Polymerization of Butadienes in Aqueous Emulsion.** (Synthetic.) I. G. Farbenindustrie A. G.
523,189. **Chlorinated Rubber.** L. Mellersh-Jackson, (Hercules Powder Co.).
523,208. **Coagulation of Aqueous Dispersions.** (Latex.) E. I. du Pont de Nemours & Co., Inc.
523,456. **Preservation of Rubber.** Imperial Chemical Industries, Ltd.
523,705. **Plasticized Hydrocarbons.** Armour & Co.
523,749. **Chlorinated Rubber and Product Thereof.** L. Mellersh-Jackson, (Hercules Powder Co.).

GENERAL

United States

2,209,967. **Auto Wheel** with Curb Guard for Tire. M. P. Golod, New York, assignor of one-half to H. Zeidner, Edgemore, and one-half to M. M. Meyers, New York, all in N. Y.
2,209,997. **Binder Reel Attachment** with Rubber Blades. C. Nordhougen, Leeds, N. Dak.
2,210,003. **Adhesive Tape Dispenser and Sponge Rubber Applier.** C. H. Randolph, assignor to Minnesota Mining & Mfg. Co., both of St. Paul, Minn.
2,210,024. **Toy Balloon Amusement Device.** J. N. Cayo, Benton Harbor, Mich.
2,210,073. **V-Belt** with Small Grooves on Underside. A. L. Freedlander, assignor to Dayton Rubber Mfg. Co., both of Dayton, O.
2,210,177. **Temporary Protective Coatings** for Rubber. P. C. Rader, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,210,183. **Silverware Chest** with Rubber Sealing Gasket. R. Schweighart, Humboldt, Ill.
2,210,215. **Multiple-Service Electrical Tap.** W. P. Herman, Providence, R. I.
2,210,275 **Tie and Shirt Garter.** F. E. Bertling, Spokane, Wash.
2,210,281. **Tombstone.** (Latex.) D. F. Cook, assignor of one-half to J. R. Fotheringham, both of Pinconning, Mich.
2,210,289. **Auto Radio Antenna** with Rubber-Like Insulation Material. W. C. Harp., assignor to A. O. Smith Corp., both of Milwaukee, Wis.
2,210,348. **Roofing Material** with Coating Containing Rock Asphalt, Asbestos, Rubber, Resin, Turpentine, Non-Drying Oil. J. W. Swope, Waco, assignor of 5% to E. A. Flowers, Jr., and 7% to E. D. Garrett, both of McLennan County, all in Tex.
2,210,534. **Pressure Gage** for Pneumatic Tires. W. L. Hager, Oshkosh, Wis.
2,210,657. **Wringer Roll Drive Device.** N. L. Etten, assignor to Chamberlain Corp., both of Waterloo, Ia.
2,210,711. **Escalator.** J. Dunlop, Ridgewood, assignor to Westinghouse Electric Elevator Co., Jersey City, both in N. J.
2,210,744. **Catheter.** G. L. Winder, Cuyahoga Falls, assignor to American Anode, Inc., Akron, both in O.
2,210,748. **Oil Seal Diaphragm** of Chloroprene-Bound Leather Fibers. (Synthetic.) W. F. Bernstein, Brookfield, assignor to Victor Mfg. & Gasket Co., Chicago, both in Ill.
2,210,753. **Attaching Shoe Upper to a Welt.** W. P. Field, Brockton, Mass.
2,210,754. **Bath Mitt.** H. S. Frank, assignor to Prince Matchabelli, Inc., New York, N. Y.
2,210,809. **Lifesaving Device.** L. C. Gray, Omak, Wash.
2,210,833. **Sealing Gasket.** L. E. Clough, assignor to General Tire & Rubber Co., both of Akron, O.
2,210,840. **Snubber.** A. H. Oelkers, assignor to American Steel Foundries, both of Chicago, Ill.
2,210,841. **Shoe** with Elastic Instep Protection. J. C. Pape, Larchmont, assignor to I. Miller & Sons, Inc., Long Island City, both in N. Y.
2,210,846. **Water-Air Mixer.** E. Aghnides, New York, N. Y.
2,210,858. **Elastic Scalp-Treating Device.** E. O. Loeber, East Cleveland, O.
2,210,897. **Hair Waving System.** A. Caldora, Brooklyn, assignor of one-half to P. Michielli, Woodhaven, both in N. Y.
2,210,949. **Pressure Means** for Wringer Rolls. J. L. Perkins, assignor to Perkins Machine & Gear Co., both of West Springfield, Mass.
2,211,063. **Inflating Device for Spare Tires.** K. Kowalkiewicz, Holyoke, Mass.
2,211,104. **Combined Cushion and Swimming Belt.** H. M. Doiguchi, Schofield Barracks, Hawaii.
2,211,137. **Self-Adjustable Sanitary Belt.** F. Lesselbaum, Brooklyn, N. Y.
2,211,147. **Flexible Hose Connection.** W. H. Miller, Royal Oak, Mich., assignor to Flex-O-Tube Co., a corporation of Del.
2,211,184. **Elastic Bound Hair Protecting Headband.** A. D. Varell, New York, N. Y.
2,211,202. **V-Belt** with Tooth-Like Depressions. A. L. Freedlander, assignor to Dayton Rubber Mfg. Co., both of Dayton, O.
2,211,237. **Sinhonless Valve** with Piston Valve Member of Flexible Deformable Material. J. D. Langdon, Los Angeles, Calif.
2,211,275. **Cloth-Covered Sponge Rubber Floor Waxer.** R. Lachapelle, Hull, P. Q., Canada.
2,211,378. **Face Lifting Device.** E. Lindi, New York, N. Y.
2,211,385. **Spring Base** for Machines Utilizing Rubber-Filler Hairpin Bent Spring Members. R. W. Preston, Clackamos County, Oreg.
2,211,427. **Escalator Handrail Drive.** S. G. Marles, Brooklyn, assignor to Otis Elevator Co., New York, both in N. Y.
2,211,431. **Lacquer Composition** Containing Solution of Chlorine-Containing Rubber. A. R. Olsen, assignor to Hercules Powder Co., both of Wilmington, Del.
2,211,446. **Hose Coupling.** A. N. Troshkin, New York, N. Y., assignor to Resistoflex Corp., Belleville, N. J.
2,211,462. **Car Truck** with Rubber Cushion between Side Frame and Bolster. R. C. Hobson, Cleveland Heights, assignor to National Malleable & Steel Castings Co., Cleveland, both in O.
2,211,476. **Rubber-Bulbed Pneumatic Control Device** for Gasoline Dispensing Systems. D. J. Nelson, Buffalo, N. Y., assignor, by mesne assignments, to Martin & Schwartz, Inc., a corporation of Md.
2,211,477. **Pneumatic Detector Switch.** O. K. Normann, Arlington, Va.; dedicated to the free use of the People of the United States.
2,211,515. **Elastic Walled Teat Cup for Milking Machines.** B. V. Orre, Stocksund, Sweden.
2,211,563. **Wringer Rolls** with Upward Extending Bite. E. V. Godfrey, Girard Township, assignor to Lovell Mfg. Co., Erie, both in Pa.
2,211,577. **Rubber Ruler Attachment** for Scissors. J. Muserlian, New York, N. Y.
2,211,578. **Coat and Shirt Display Form.** B. Oestricher, Long Beach, N. Y.
2,211,599. **Wringer.** G. J. Filia, Bridgeport, Conn., assignor to General Electric Co., a corporation of N. Y.
2,211,607. **Conveyor Belt** with Cross-Laminated Cords. S. R. Reimel, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,211,669. **Inflated Ball.** M. B. Reach, Springfield, Mass.
2,211,699. **Bulb-Operated Gasoline Dispensing Apparatus.** J. D. Lear, Buffalo, N. Y., assignor to Martin & Schwartz, Inc., Salisbury, Md.
2,211,703. **Pneumatic Means to Control Operation of Gasoline Dispensers.** C. Pleuthner, assignor to Martin & Schwartz, Inc., both of Salisbury, Md.
2,211,776. **Resilient Coupling for Tubing.** G. W. Haury, Lakeland, Fla.
2,211,780. **Electrolytic Condenser** with Rubber Plug. D. Jacobs, New York, assignor to Aerovox Corp., Brooklyn, both in N. Y.
2,211,899. **Oil Seal** Comprising Fibrous Ring and Sponge Rubber. G. M. Kriegbaum, Richmond, Ind., assignor to International Harvester Co., a corporation of N. J.
2,211,975. **Catheter.** F. C. Hendrickson, Canton, O.
2,212,024. **Tubular Belt Conveyer.** H. S. Johns, Cleveland, O., assignor to Bancroft Holdings, Ltd., Hamilton, Ont., Canada.
2,212,027. **Foundation Garment.** R. H. Lawson, Pawtucket, R. I., assignor to Scott & Williams, Inc., New York, N. Y.
2,212,049. **Hanger** for Rackets, Tools, Etc. O. C. Ryland and E. G. Ankeney, both of Los Angeles, Calif.
2,212,059. **Tire Tool.** R. G. Glover, Cromwell, Okla.
2,212,076. **Tire Antiskid Device.** W. S. Rollings, West Newton, Pa.
2,212,118. **Electric Blasting Initiator** Using a Rubber Plug. S. L. Handforth, Wilmington, Del., C. R. Johnson, Glenn Mills, Pa., and G. H. Smith, Woodbury, N. J., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
2,212,142. **Vibration Absorbing Supporting Structure.** H. M. Austin and J. A. Muir, assignors to Crown Cork & Seal Co., Inc., all of Baltimore, Md.
2,212,153. **Rubber Vibration Dampener.** J. F. Eaton and H. D. Collins, both of Tulsa, Okla.
2,212,166. **Tire & Wheel Protector.** W. A. Nelson, Detroit, Mich.
2,212,300. **Beater Bar** for Harvesting Combine Cylinders. J. F. McWhorter, assignor to Ohio Rubber Co., both of Willoughby, O.
2,212,360. **Electrical Cable** for Wiring Buildings. J. N. Aken, Rome, assignor to General Cable Corp., New York, both in N. Y.
2,212,378. **Striped Elastic Fabric.** N. E. Randall, Shannock, R. I., assignor to Columbia Narrow Fabric Co., a voluntary association of R. I.
2,212,392. **Rubber Shoe Sole Edge Protector.** M. M. Corkery, Detroit, Mich.
2,212,423. **Rubber Sleeve** to Protect Pipe Threads. L. H. Lytle, Alliance, O.
2,212,450. **Non-Skid Tire Device.** M. E. Paschke, Williamsville, N. Y.
2,212,458. **Springing Arrangement** for Vehicle Wheel. O. Siebler, Zwickau, and W. Boxan, Zschopau, both in Germany.
2,212,474. **Electric Blasting Initiator** Using a Rubber Plug. C. R. Johnson, West Chester, Pa., and R. R. Nydegger, assignors to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.
2,212,485. **Slip Cover Construction** for Upholstered Furniture. J. A. Krasnov, Philadelphia, assignor to Sure-Fit Products Co., Darby, both in Pa., a co-partnership consisting of J. A. and S. Krasnov.
2,212,550. **Rubber Mounted Screening Apparatus.** W. J. Parks, Cleveland, O.
2,212,567. **Drop Dispensing Bottle** with Rubber Valve. E. Kirmes, London, England.
2,212,577. **Lug Strap of Rubberized Fabric.** H. F. Webster, Warren, O.
2,212,607. **Diaphragm and Pressure Operated Valve** with Rubber-Like Disk. J. D. Langdon, Los Angeles, Calif.
2,212,716. **Wheel and Tire Replacing Tool.** E. L. Noble and O. E. Merrick, both of Ramona, Calif.
2,212,745. **Resilient Coupling** for Tubing. R. D. McIntosh, River Forest, assignor to Imperial Brass Mfg. Co., Chicago, both in Ill.
2,212,768. **Tire Remover and Compressor.** S. S. Bonneau, McAllen, Tex.
2,212,769. **Spring Suspension** for Motor Vehicles. W. Boxan, Zschopau, assignor to Auto Union A. G., Chemnitz, both in Germany.
2,212,804. **Rubber Vacuum Jar Cap Seal.** R. W. Wynings, E. Wynings, guardian of R. W. Wynings, incompetent, assignor, by direct and mesne assignments, to E. Keefer, all of Youngstown, O.
2,212,867. **Flexible Transmission Coupling.** W. E. Sparrow, Birmingham, England, assignor to Spicer Mfg. Corp., Toledo, O.

2,213,057. **Combination Syringe, Hot and Cold Pack Appliance.** C. J. Sponsel, assignor to Walgreen Co., both of Chicago, Ill.
2,213,094. **Hat Flanging Machine** Utilizing a Rubber Sheet. M. Schildhaus, New York, N. Y.
2,213,159. **Strip Rubber** for Concrete Form. T. C. Durley, Esher, assignor to Trussed Concrete Steel Co., Ltd., Westminster, London, both in England
2,213,293. **Electrical Connector and Spring Contact Therefor.** R. A. Walker, assignor, by mesne assignments, to United States Rubber Co., both of New York, N. Y.
2,213,356. **Sponge Rubber Massage Device.** S. D. Dunlap, Detroit, Mich.
2,213,369. **Thrust Bearing** with Elastic Compression Pad. E. H. Piron, assignor to Transit Research Corp., both of New York, N. Y.
2,213,482. **Massage Roller.** P. Avery, Oakland, Calif.
2,213,529. **Elastic Topped Hosiery.** J. W. Mettler, East Millstone, N. J., and J. H. Miller and R. Evans, both of Martinsburg, W. Va., assignors to Interwoven Stocking Co., New Brunswick, N. J.
2,213,535. **Tire Changing Stand.** H. F. Seip, Waltham, Mass.
2,213,539. **Control Unit** for Tire Inflation Systems. C. Wiegand, Seattle, Wash.
2,213,661. **Hat** with Elasticized Sweat Band. E. Adamson, Rye, assignor to United States Rubber Co., New York, both in N. Y.
2,213,757. **Bathing Garment Construction.** M. R. Barnes, Palos Verdes Estates, assignor to Hollywood Silk Mills, Los Angeles, both in Calif., a co-partnership composed of M. R. and W. E. Barnes.
2,213,782. **Flat Tire Detector.** C. C. Kite, Logansport, Ind.
2,213,883. **Rubberized Fabric.** J. M. Lurie, assignor to W. S. Libbey Co., Lewiston, Me.

Dominion of Canada

390,611. **Bust Support with Elastic Straps.** Lucien Labbé, Quebec, P. Q.
390,643. **Composite Rubber Gasket,** Canadian Westinghouse Co., Ltd., Hamilton, Ont., assignee of P. W. Dempsey, Pittsburgh, Pa.
390,665. **Lighting Fitting** with Resilient Support. General Electric Co., Ltd., London, assignee of G. S. Robinson, East Grinstead, Sussex, both in England.
390,667. **Skid-Ring Tractor Tire.** B. F. Goodrich Co., New York, N. Y., assignee of H. W. Delzell, Akron, O., both in the U. S. A.
390,709. **Railway Car Coupler Device.** Standard Railway Equipment Mfg. Co., Chicago, assignee of G. G. Gilpin, Riverside, both in Ill., U. S. A.
390,714. **Windshield Cleaner.** Trico Products Corp., assignee of R. E. Rousseau, both of Buffalo, N. Y., U. S. A.
390,741. **Railway Car Truck** Resiliently Mounted. Pullman-Standard Car Mfg. Co., assignee of W. H. Mussey, Chicago, Ill., U. S. A.
390,749. **Ice Surfacer** with Rubber Blade. W. C. Hill and C. Smith, co-inventors, both of Hamilton, Ont.
390,760. **Rubber Tooth Cleaning and Gum Massaging Appliance.** L. L. Fuller, Goldfields, Sask.
390,761. **Automobile Leaf Spring Drive Substitution.** J. Haltenberger, Ann Arbor, Mich., U. S. A.
390,762. **Automobile Suspension** for Drive Axles. J. Haltenberger, Ann Arbor, Mich., U. S. A.
390,791. **Tire Anti-Skid Chain Link.** American Chain & Cable Co., Inc., New York, N. Y., assignee of J. R. Reyburn, Fairfield, Conn., both in the U. S. A.
390,823. **Tire Casing Wrapping Method.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of W. A. Ringler, Wayne, Pa. U. S. A.
390,860. **Typewriter Platen.** L. C. Smith & Corona Typewriters, Inc., Syracuse, assignee of H. A. Avery and J. P. Barkdoll, co-inventors, both of Groton, all in N. Y., U.S.A.
390,895. **Toy Aerial Rocket** with Rubber Band Motive Power. A. Horak, Chicago, Ill., U. S. A.
390,906. **Surgical Protective Covering** for Hands, Etc. S. I. Conen, Boston, Mass., U. S. A.
390,988. **Foundation Garment.** Scott & Williams, Inc., Laconia, N. H., assignee of R. H. Lawson, Pawtucket, R. I., both in the U. S. A.
391,062. **Wringer Feed Bar.** Beatty Bros., Ltd., assignee of W. G. Beatty, Fergus, Ont.
391,092. **Machinery Packing Material** Comprising Twisted Glass Fibers with Rubber Coating. Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of J. L. Buckley, Tenafly, N. J., U. S. A.
391,098. **Pneumatic Tire** with Tread Having Narrow, Closely-Spaced Circumferential Ribs. General Tire & Rubber Co., assignee of H. T. Kraft, both of Akron, O., U. S. A.
391,099. **Undergarment.** Goodenow Textiles Co., assignee of J. F. Goodenow, both of Kansas City, Mo., U. S. A.
391,113. **Vehicle Wheel.** Motor Wheel Corp., assignee of H. J. Horn, both of Lansing, Mich., U. S. A.
391,114. **Vehicle Wheel.** Motor Wheel Corp., assignee of S. N. Johnson, both of Lansing, Mich., U. S. A.

United Kingdom

521,088. **Fountain Pens.** A. J. Keen and W. H. Kimberley.
521,091. **Combs.** H. Taub.
521,219. **Resilient Wheel Mountings** for Aircraft Undercarriages. G. H. Dowty.
521,253. **Cables.** Felten & Guilleaume Carlswerke Akt.-Ges.
521,274. **Buffers.** D. M. Hannah and Clyde Rubber Works Co., Ltd.
521,296. **Insulated Electrical Conductors.** Standard Oil Development Co.
521,433. **Tool** to Strip the Insulation from Cables. P. C. Major.
521,450. **Corsets.** S. D. Ryall.
521,466. **Washing and Wringing Machines.** Entwisle & Kenyon, Ltd., and J. M. Kenyon.
521,482. **Wheel Devices.** Goodrich Soc. Anon.
521,483. **Resilient Wheels.** Goodrich Soc. Anon.
521,520. **Resilient Supports** for Damping Vibrations. M. F. A. Julien.
521,549. **Cables.** Callender's Cable & Construction Co., Ltd., and J. Urmston.
521,577. **Cushioning Facilities for Seats.** Mishawaka Rubber & Woolen Mfg. Co.
521,583. **Pneumatic Tires and Inner Tubes.** United States Rubber Co.
521,622. **Means for Connecting Hose Pipes to Taps.** Newton Sales Co., Ltd., and A. L. Willcox.
521,801. **Cables.** Standard Telephones & Cables, Ltd., E. Baguley, R. J. Vezey, R. L. Hughes, and D. P. Dalzell.
522,188. **Tire Treads.** United States Rubber Co.
522,191. **Lubricating Compositions.** United States Rubber Co.
522,331. **Alarm Device** for Indicating Relative Pressure Changes in Twin Pneumatic Tires. Y. Maladry and M. C. Hamet.
522,343. **Flexible Hoses** for Conveying Fluids at High Pressures. Automotive Products Co., Ltd., John Bull Rubber Co., Ltd., and J. O. Randle.
522,355. **Elastic Knitted Fabric.** W. Blank.
522,399. **Tire-Carrying Wheels.** Constant Speed Airscrews, Ltd., and F. G. Marshall.
522,573. **Wheels.** Firestone Tire & Rubber Co., Ltd.
522,648. **Molding Thermosetting Plastic Material,** Particularly for Rubber Printing Plates. Bakelite, Ltd.
522,670. **Shoes** for Overall Chains or Girdles for Vehicle Wheel Tires. D. S. Kennedy.
522,677. **Resilient Mountings or Suspensions.** L. Thiry.
522,718. **Cap or Device to Protect Knees or Elbows of Miners, Etc.** Dunlop Rubber Co., Ltd., and G. B. Ainsworth.
522,830. **Resilient Motor Suspensions.** Westinghouse Electric International Co.
522,833. **Aircraft Under-Carriages** with Resilient Wheel Mountings. G. H. Dowty.
522,877. **Foundation Garment.** H. W. Gossard Co.
522,906. **Tire Chain.** American Chain & Cable Co., Inc.
522,947. **Pneumatic Tires.** J. R. S. Goodall, W. J. S. Naunton, and Imperial Chemical Industries, Ltd.
523,149. **Carbon Blacks.** W. Baird, J. R. S. Waring, and Imperial Chemical Industries, Ltd.
523,229. **Flexible Multicore Electric Cables.** Pirelli-General Cable Works, Ltd., and J. L. Bishop.
522,383. **Electrical Insulation.** British Thomson-Houston Co., Ltd.
523,345. **Elastic Webbing.** P. H. Boivin.
523,486. **Windscreen-Wiper Blades.** W. E. O'Shei.
523,499. **Fabrics** for Overcoats, Etc. Ioco Rubber & Waterproofing Co., Ltd., (M. Marchal).
523,519. **Shoes** of Overall Chains or the Like for Road Vehicle Tires. E. A. Dennison and Kennedy & Kempe, Ltd.
523,586. **Tire Anti-Skid Device.** A. R. Whittington.
523,643. **Footwear.** Greengate & Irwell Rubber Co., Ltd., and J. Ridings.
523,658. **Rubber Soles.** P. A. Sperry.
523,683. **Wear-Resistant Rubber Articles and Surfaces.** D. Van Der M. Haarhoff and Anti-Abradants (Proprietary), Ltd.
523,684. **Suspenders** for Stockings or the Like. B. Herrman.
523,748. **Electric Cables.** Liverpool Electric Cable Co., Ltd., R. F. D. Milner and J. T. Frost.
523,766. **Foundation Garments.** Vogue Mfg. Co.

TRADE MARKS

United States

380,094. **Flexo-Pac.** Rubber packing for pipe joints. H. R. Kuhns, Killbuck, O.
380,104. **Fil-O-Matic.** Storage batteries and covers, therefor. Firestone Tire & Rubber Co., Akron, O.
380,232. **Taproid.** Synthetic rubber tubing. Eastern Allied Sales Corp., New York, N. Y.
380,273. **Airtex.** Surgical bandages. Brewer & Co., Inc., Worcester, Mass.
380,298. **Triumph.** Prophylactic rubber articles. Arrow Rubber Corp., New York, N. Y.
380,363. **Glas-tex.** Food guards, crib sheets, bridge table covers, and window curtains. A. Stein & Co., Chicago, Ill.
380,411. **Ethyl Tuads.** Ultra-accelerator and vulcanizing agent. R. T. Vanderbilt Co., Inc., New York, N. Y.
380,541. Representation of a bird with the words: **"Rhythm Step"** above it, and surrounded by, from right to left, three black dots containing numerals: **"1, 2, 3,"** with arrows proceeding from the dots. Footwear. Johnson-Stephens & Shinkle Shoe Co., St. Louis, Mo.
380,551. **Flexo.** Armbands and apparel belts. A. Stein & Co., Chicago, Ill.
380,557. **Duwear.** Rubber heels. Jenco Bros., Inc., Paterson, N. J.
380,558. **"Kabo-ette."** Corsets. Kabo Corset Co., Chicago, Ill.
380,560. **"Shorts."** Prophylactic rubber articles. Lorica Laboratories, Inc., Jersey City, N. J.
380,566. Representation of the words: **"Cream of Comfort"** above the words: **"Arch Support."** Footwear. Durand Shoe Co., Richmond, Me.
380,567. **A H.** Clothing and footwear. Adam Hat Stores, Inc., New York, N. Y.
380,575. **Babykin.** Sheeting and mattress covers. Brody Mfg. Co., not Inc., Chicago, Ill.
380,611. **Spunkez Footwear.** Marshall, Meadows & Stewart, Inc.
380,613. Representation of a frame partly formed by two lions' heads and a crown. Footwear. Regal Shoe Co., New York, N. Y.
380,615. **Glas-tex.** Garters, armbands, shower caps, etc. A. Stein Co., Chicago, Ill.
380,625. Representation of a black square containing a white crown above the words: **"Luxury, Durability, Warmth"** in a white box above the words: **"Ganado Fabric."** Clothing and footwear. **Trimount Clothing Co.,** Inc., Boston, Mass.
380,628. **"Rain-chex."** Rubbers. De Noronha Rubber Products Corp., Woodstown, N. J.
380,651. **Pink Lemonade.** Women's clothing. Revlon Products Corp., New York, N. Y.
380,652. **Red Punch.** Women's clothing. Revlon Products Corp., New York, N. Y.
380,665. **May-O-Pedic.** Footwear. May Department Stores Co., New York, N. Y.
380,675. **Allo-ette.** Corsets, etc. Maiden Form Brassiere Co., Inc., New York, N. Y.
380,689. Representation of the word: **"Copeg"** in an arc-sided rectangle. Footwear. Copeland & Ryder Co., Jefferson, Wis.

United States Latex Imports

Year	Pounds (d.r.c.)	Value
1938	26,606,048	$ 4,147,318
1939	61,460,003	10,467,552
1940		
Jan.	7,639,568	1,412,728
Feb.	4,862,684	947,524
Mar.	7,561,780	1,473,056
Apr.	8,430,063	1,608,156
May	8,029,276	1,523,879
June	5,490,018	1,004,007
July	5,109,739	993,411
Aug.	5,102,983	1,022,531

Data from Leather and Rubber Division, Washington, D. C.

Current Quotations

(*Continued from page 82*)

Tackifier

B.R.H. No. 2 ..... *lb.* $0.017 /$0.02

Varnish

Shoe ..... *gal.* 1.45

Vulcanizing Ingredients

Sulphur ..... 100 *lbs.* 2.00
Chloride (*drums*) ..... *lb.* .035 / .04
Telloy ..... *lb.* 1.75
Vandex ..... *lb.* 1.75
(See also Colors—Antimony)

Waxes

Carnauba, No. 3 chalky .... *lb.*
2 N.C. ..... *lb.*
3 N.C. ..... *lb.*
1 Yellow ..... *lb.*
2 ..... *lb.*
Montan, crude ..... *lb.*

YARWAY
HYDRAULIC VALVE
GREATER EASE AND FLEXIBILITY OF CONTROL
THE HIGHER THE PRESSURE THE TIGHTER THE VALVE
AUTOMATICALLY REGRINDS OWN SEALING SURFACES
LONG TROUBLE-FREE LIFE LOW MAINTENANCE
QUARTER CENTURY OF SUCCESSFUL USE
Made in straightway, three-way and four-way types — Write for Bulletin H-2-C
YARNALL-WARING COMPANY
103 MERMAID AVENUE PHILA., PA.

KEEP YOUR EYE ON CUTTING COST
CAMACHINE
40-3L
FOR STRAIGHT AND BIAS BINDINGS
CAMERON MACHINE COMPANY
61 POPLAR ST. - - - - BROOKLYN, N. Y.

Rubber Trade Inquiries

The inquiries below are of interest not only in showing the needs of the trade, but because additional information may be furnished by readers. The Editor is glad to have those interested communicate with him.

No.	Inquiry
2790	Manufacturers of rubber stoppers, rubber droppers, and finger cots.
2791	Manufacturers of liner door gaskets.
2792	Manufacturers of rubber balls with a tunnel through the ball for placing it at end of wooden bar.
2793	Suppliers of gutta percha sheeting.
2794	Manufacturers of rubberized fabric for lining water tanks.
2795	Manufacturers of rubber decoys.

Imports by Customs Districts

	July, 1940		July, 1939	
	*Crude Rubber Pounds	Value	*Crude Rubber Pounds	Value
Massachusetts	9,973,355	$1,757,139	10,269,452	$1,685 502
Buffalo	.....	.....	59,730	8,550
St. Lawrence	2,260	401	.....	.....
New York	112,231,172	20,027,035	50,755,297	8,066,918
Philadelphia	939,833	159,612	2,640,306	395,756
Maryland	4,762,652	812,110	1,550,479	230,095
Georgia	.....	.....	827,947	118,199
Mobile	886,490	147,418	1,211,292	173,053
New Orleans	8,894,201	1,505,653	9,441,332	1,411,461
Galveston	56,000	9,148	55,869	8,576
San Antonio	41,000	4,215	.....	.....
El Paso	56,000	4,850	44,800	4,399
Los Angeles	13,642,168	2,374,064	5,331,835	840,359
San Francisco	556,998	101,148	1,507,144	223,103
Oregon	67,000	11,390	16,800	2,662
Michigan	10,153	1,726	.....	.....
Ohio	3,502,032	557,192	167	25
Totals	155,621,314	$27,473,101	83,712,450	$13,168,658

*Crude rubber including latex dry rubber content.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co.	Pfd.	$2.00 q.	Sept. 30	Sept. 20
Anaconda Wire & Cable Co.	Com.	$0.25	Oct. 21	Oct. 11
Baldwin Rubber Co.	Com.	$0.125 q.	Oct. 21	Oct. 15
Crown Cork International Corp.	"A"	$0.15 accum.	Oct. 1	Sept. 20
Detroit Gasket & Mfg. Co.	Com.	$0.25	Oct. 21	Oct. 5
Dow Chemical Co.	Com.	$0.75	Nov. 15	Nov. 1
Dow Chemical Co.	Pfd.	$1.25 q.	Nov. 15	Nov. 1
Electric Storage Battery Co.	Com.	$0.50	Sept. 30	Sept. 16
Electric Storage Battery Co.	Pfd.	$0.50	Sept. 30	Sept. 16
Firestone Tire & Rubber Co.	Com.	$0.25	Oct. 21	Oct. 4
Garlock Packing Co.	Com.	$0.75	Sept. 30	Sept. 21
General Electric Co.	Com.	$0.35	Oct. 25	Sept. 20
General Tire & Rubber Co.	Pfd.	$1.50 q.	Sept. 30	Sept. 20
Goodyear Tire & Rubber Co. of Canada, Ltd.	Com.	$0.62 q.	Sept. 14	Oct. 1
Hercules Powder Co.	Pfd.	$1.50 q.	Nov. 15	Nov. 4
Jenkins Bros.	(Non-Vot.)	$0.25 q.	Sept. 24	Sept. 13
Jenkins Bros.	(Founders shares)	$1.00 q.	Sept. 24	Sept. 13
Jenkins Bros.	Pfd.	$1.75 q.	Sept. 24	Sept. 13
I. B. Kleinert Rubber Co.	Com.	$0.30 irreg.	Sept. 30	Sept. 16
Lee Rubber & Tire Corp.	Com.	$0.75	Oct. 28	Oct. 15
Link Belt Co.	Com.	$0.25 q.	Dec. 2	Nov. 8
Link Belt Co.	Pfd.	$1.625 q.	Jan. 2	Dec. 16
Mansfield Tire & Rubber Co.	Com.	$0.10	Sept. 20	Sept. 10
Mansfield Tire & Rubber Co.	$1.20 Conv. Pfd.	$0.30 q.	Oct. 1	Sept. 7
Norwalk Tire & Rubber Co.	Pfd.	$0.875 q.	Oct. 1	Sept. 17
Ohio Rubber Co.	Com.	$5.00 irreg.	Sept. 25	Sept. 20
Rome Cable Corp.	Com.	$0.10	Oct. 1	Sept. 14
Seiberling Rubber Co.	Pr. Pfd.	$0.63 q.	Oct. 1	Sept. 20
Seiberling Rubber Co.	Pr. Pfd. "A"	$1.25 q.	Oct. 1	Sept. 20

Malaya

(*Continued from page 70*)

Rubber Research Institute Work Curtailed

The Rubber Research Institute of Malaya had to curtail activities in July and August because it had to work with a depleted staff when eight of its European members were called up for intensive training in the Volunteers. Until the training period was over requests for advice could not be filled, and no visitors were received at the Experiment Station. A Rubber Research Institute Planters' Conference was planned for August 2 on "The Choice of Planting Material," but this has been postponed to a later date still to be announced.

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES
Light face type $1.00 per line (ten words)
Bold face type $1.25 per line (eight words)
Allow nine words for keyed address.

SITUATIONS WANTED RATES
Light face type 40c per line (ten words)
Bold face type 55c per line (eight words)

SITUATIONS OPEN RATES
Light face type 75c per line (ten words)
Bold face type $1.00 per line (eight words)
Replies forwarded without charge.

SITUATIONS WANTED

TECHNOLOGIST, 20 YEARS OF PRACTICAL EXPERIENCE IN rubber, neoprene, Perbunan, cork and wood flour, gaskets, flooring, etc., compounding and factory practices. Address Box No. 149, care of INDIA RUBBER WORLD.

ORGANIC CHEMIST, M.S., M.I.T., SIXTEEN YEARS IN Research, Development, and Production. Intimate knowledge of latex sponge processes. Good diversified background in Organic and Inorganic Chemistry. Excellent references. Available immediately. Address Box No. 150, care of INDIA RUBBER WORLD.

I'LL TRADE YOU AMBITION, ENERGY, ABILITY, AND THE experience of 6 months' plant engineering in hard rubber and storage batteries at Buffalo; 6 months' photographer, at N.Y.C.; for one good position, anywhere. G. RYDER, Bachelor Chemical Engineering, 1939, 23 years, 2105 Quentin Road, Brooklyn, New York.

RESEARCH CHEMIST, PH.D., WITH 11 YEARS' EXPERIENCE IN compounding. Highly specialized in Buna and other synthetics, here and abroad. Well grounded in latex. Address Box No. 152, care of INDIA RUBBER WORLD.

PRACTICAL RUBBER MAN WITH WIDE KNOWLEDGE OF small molded goods, especially interested in development work, desires new connections. Address Box No. 157, care of INDIA RUBBER WORLD.

RUBBER ENGINEER. GRADUATE CHEMICAL ENgineer, M.I.T., offers seasoned experience in the manufacture of tires and tubes; solid tires; golf balls; molded goods; all kinds of belting and hose; automotive products—brake lining, clutch facings, steering wheels, fan belts, molded plastic products; railroad specification goods; battery boxes; soles and heels, and specialties. Desires opportunity to demonstrate his ability. Available after short notice. Address Box No. 158, care of INDIA RUBBER WORLD.

RUBBER CHEMIST, WITH FOURTEEN YEARS' EXPERIENCE in diversified mechanical goods, who has met with success in compounding, technical sales, and production work; is active in professional organizations, and has a wide acquaintance in the rubber and allied industries; is capable of organizing, setting up development procedures, and solving factory problems rapidly. Will consider position as technical or production superintendent, or in technical sales. Address Box No. 160, care of INDIA RUBBER WORLD.

FOSTER D. SNELL, INC.
Our staff of chemists, engineers and bacteriologists with laboratories for analysis, research, physical testing and bacteriology are prepared to render you
Every Form of Chemical Service
305 Washington Street **Brooklyn, N. Y.**

Compounding Ingredients for Rubber
by the Editors of
INDIA RUBBER WORLD
$2.50 Postpaid in U. S. A. **$2.75 Elsewhere**

SITUATION OPEN

TECHNICAL SALESMAN WITH EXPERIENCE IN LATEX PROCesses and compounding for field and occasional laboratory work. Give full details in first letter. Address Box No. 156, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

ROYALTIES PAID
ON ROLL IMPROVEMENTS
A long-established Massachusetts concern specializing in the manufacture of wood, metal, and rubber rolls will pay royalties for exclusive manufacturing and sales rights on roll improvements. Address Box No. 151, care of INDIA RUBBER WORLD.

WANTED: SALESMAN CALLING ON MANUFACTURERS OF molded rubber goods to represent manufacturer of punch presses adapted to machine trimming. Address Box No. 154, care of INDIA RUBBER WORLD.

WANTED: EXTRUDING WORK FOR SMALL OHIO PLANT. Low overhead. Address Box No. 155, care of INDIA RUBBER WORLD.

RUBBER PLANT WITH SURPLUS BUSINESS DESIRES MAN WITH executive ability to invest and take active part. Additional capital to be used for expansion or will sell controlling interest. Address Box No. 159, care of INDIA RUBBER WORLD.

EXCEPTIONAL FACILITIES FOR COMPOUNDING AND MILLING uncured stocks. E. J. McCORMICK RUBBER CO., INC., 62 Bergen Turnpike (Cor. Union), Ridgefield Park, N. J. Tel.: Hackensack 3-0936.

DETROIT LAWYER WITH DOWNTOWN OFFICE WISHES permanent part time employment as manufacturers' representative. Graduate University of Michigan Law School, 1937. Have general business and selling experience. MORTON A. EDEN, National Bank Building, Detroit, Mich.

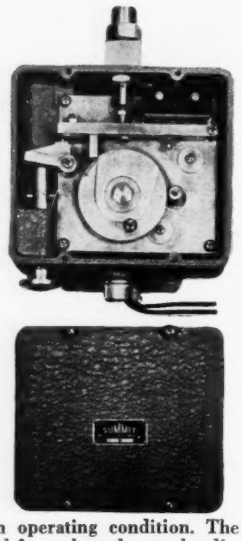
INTERNATIONAL PULP CO.
41 Park Row, NEW YORK, N. Y.
SOLE PRODUCERS
ASBESTINE
REG. U. S. PAT. OFF.

SINCE 1880 RUBBER GOODS
Rand REG. U. S. PAT. OFF.
"They Last Longer" REG. U. S. PAT. OFF.
DRESS SHIELDS
DRESS SHIELD LININGS
BABY PANTS
BABY BIBS & APRONS
SANITARY WEAR
RUBBERIZED SHEETING
RUBBER APRONS
STOCKINET SHEETS
RUBBER SHEETS
RAINCAPES & COATS
RUBBER SPECIALTIES
DOLL PANTS, CAPES, ETC.
RUBBER DAM & BANDAGES — SHEET GUM
RAND RUBBER CO. BROOKLYN, N. Y. U. S. A. MFRS.

ROBERT BADENHOP CORPORATION
CRUDE RUBBER
GUTTA PERCHA
LIQUID LATEX
GUTTA SIAK
BALATA
WOOLWORTH BLDG. (TEL. CORTLAND 7-6920) NEW YORK, N.Y.

(*Advertisements continued on page* 93)

MODEL "T" TIMER



Designed to, and does, meet the requirements of a simple, accurate and dependable control for the less complicated cycles of automatic production methods.

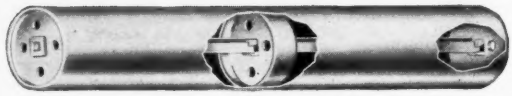
The closing of a curing press and the reopening of that press after a definite time interval is one of the applications of this instrument. It may also be used to do the above job together with a number of bumps, or quick openings of the press, for the release of trapped gases.

The simple connection of two wires to the 110 volt electric supply puts this instrument in operating condition. The air supply to the pilot valve and from the valve to the diaphragm valve may be connected with copper tubing and is quickly installed.

We will be pleased to suggest the most practical applications of this instrument in your plant if you will just send us a line of inquiry.

SEELY INSTRUMENT CO., Inc.
AKRON OHIO

NEW AND BETTER GAMMETER'S
ALL STEEL ALL WELDED
CALENDER STOCK SHELL



4" 5" 6" 8" 10" 12" diameters, any length.
Besides our well known Standard and Heavy Duty Constructions, we can supply light weight drums made up to suit your needs.
THE W. F. GAMMETER COMPANY
CADIZ, OHIO

FINELY PULVERIZED—BRILLIANT
COLORS
for RUBBER
Chicago Representative FRED L. BROOKE 228 N. La Salle St.
Pacific Coast Representative MARSHALL DILL San Francisco
Cleveland, PALMER-SCHUSTER CO., 975-981 Front St.
Manufactured by
BROOKLYN COLOR WORKS, INC.
Morgan and Norman Avenues Brooklyn, N. Y.

World Net Imports of Crude Rubber—Long Tons

Year	U.S.A.	U.K.†	Argentine	Australia	Belgium	Canada	France	Greater Germany‡	Italy	Japan	Poland	Sweden	U.S.S.R.	Rest of World	Total
1938...	406,300	168,172	7,700	12,300	11,300	25,700	58,100	107,900	28,200	46,300	7,900	8,300	26,800	49,200	928,000
1939...	486,348	70,800¶	9,552	15,426	9,593	32,508	33,751§	62,344§	12,582§	42,351	5,415§	7,965a	14,000*	61,866	603,842¶
1940															
Jan. ..	71,541	....	1,049	921	891	5,047	....	....	....	4,547	....	....	....	....	....
Feb. ..	41,797	....	565	1,846	694	3,508	....	....	....	5,243	....	....	....	....	....
Mar. ..	58,283	....	756	1,784	....	3,062	....	....	....	6,057	....	....	....	....	....
Apr. ..	70,135	....	606	1,612	....	3,096	....	....	....	2,000*	....	....	....	....	....
May ..	50,621	....	589	2,100	....	3,108	....	....	....	2,500*	....	....	....	....	....
June ..	53,266	....	....	1,181	....	1,062	....	....	....	....	....	....	....	....	....

*Estimated, and to Aug. 31, 1939, only. †U. K. figures show gross imports, not net imports. ‡Including imports of Austria and Czechoslovakia. ¶Up to Aug. 31, 1939, only. §Up to July 31, 1939, only. aUp to Sept. 30, 1939. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Shipments of Crude Rubber from Producing Countries—Long Tons

Year	Malaya including Brunei and Labuan	N.E.I.	Ceylon	India	Burma	North Borneo	Sarawak	Thailand	French Indo-China	Total	Philippines and Oceania	Nigeria (incl. Brit. Liberia†	Cameroons)	Other Africa	South America	Mexican Guayule	Grand Total
1938 ..	372,000	298,100	49,500	8,500	6,700	9,500	17,800	41,600	59,200	862,900	2,000*	2,900	31.00	59.00*	15,300	2,800	894,900
1939 ..	376,755	372,046	61,028	9,241	6,616	11,864	24,014	41,753	65,219	968,536	2,079*	5,435	28.24	66.00*	16,094	2,861	1,004,429
1939																	
Jan. ..	24,393	38,680	7,237	764	1,115	1,604	2,342	2,951	4,532	83,618	220	528	2.46	5.50	1,812	347	87,321
Feb. ..	29,278	24,996	5,495	947	618	664	1,484	5,585	5,293	74,360	158	435	2.96	5.50	1,187	319	77,305
Mar. ..	29,298	27,933	3,718	773	619	344	1,177	5,378	4,501	73,741	230	427	2.79	5.50	1,407	210	76,844
Apr. ..	29,779	28,338	2,225	881	379	1,687	2,446	2,685	2,657	71,077	135	533	1.88	5.50	1,206	167	73,856
May ..	29,598	24,429	2,805	1,002	668	558	1,649	2,827	4,584	68,120	129	...	1.16	5.50	1,077	231	70,223
June ..	22,052	27,510	3,707	630	805	332	1,157	1,748	4,663	62,604	140	667	3.08	5.50	676	166	65,111
July ..	26,013	35,679	5,019	782	503	1,603	3,092	5,599	3,367	81,657	190	516	2.82	5.50	1,071	264	84,530
Aug. ..	40,973	27,477	5,620	203	213	975	1,749	5,231	7,020	89,461	231	222	3.07	5.50	1,313	378	92,462
Sept. ..	26,908	37,755	6,064	691	89	429	1,932	4,671	5,943	84,482	94	599	1.34	5.50	1,356	46	87,261
Oct. ..	49,458	44,998	5,234	665	150	1,730	2,487	2,473	5,022	112,217	122	561	1.46	5.50	1,524	356	115,476
Nov. ..	35,773	30,334	4,402	370	449	1,322	2,023	1,428	6,540	82,641	256	614	2.95	5.50	1,198	137	85,691
Dec. ..	33,232	23,917	9,502	1,533	1,008	616	2,476	1,177	11,097	84,558	174	333	2.27	5.50	2,267	240	88,349
1940																	
Jan. ..	26,229	54,148	7,698	839	833	1,858	2,256	5,722	5,238	104,821	185	1,191	1.47	6.00	1,550	128†	108,622
Feb. ..	45,651	37,958	8,946	2,030	892	1,164	2,678	4,307	6,931	110,557	94	477	2.34	6.00	1,662	314†	113,938
Mar. ..	47,885	42,355	5,305	1,070	871	1,050	3,526	3,111	3,551	108,724	178	548	3.43	6.00	1,482	365†	112,240
Apr. ..	25,454	44,372	4,148	817	990	1,799	2,951	1,834	2,927	85,292	203	598	1.20	6.00	1,159	314†	88,286
May ..	57,874	40,221	7,341	1,183*	1,046	1,370	2,696	2,582	4,578	118,891	189	364	2.00	6.00	2,305	288†	122,837
June ..	45,471	44,750	5,603	1,184*	712	1,421	4,077	2,178	2,730	108,126	200*	600*	2.00	6.00	1,080	200*	111,006
July ..	42,861	60,478	7,329	1,257*	310	1,767	2,494	4,253	4,000*	124,749	200*	600*	2.00	6.00	1,036	200*	127,585

* Estimated. †Guayule rubber imports into U.S.A. provisional until export figures from Mexico are received. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Classified Advertisements

Continued

MACHINERY AND SUPPLIES FOR SALE

CONSOLIDATED OFFERS: 12 - 22″ x 22″ Hydraulic Presses with 16″ rams, 3500 lbs. pressure; 60″ Mixing Rolls; 66″ 3-roll Calender; 7-Gould Triplex Hydraulic Pumps, 3-1500 PSI, 35 GPM, 4-3000 PSI, 18 GPM; 2-Watson-Stillman 4-cylinder opposed Hydraulic Pumps, 6000 lb. PSI, 25 GPM, motor driven, 100 HP AC motors; Watson-Stillman Hydro-Pneumatic Accumulator, 8″ ram, 48″ stroke, 42″ air cylinder, 5000 lb. PSI, complete with high-pressure air receiver and inter-connecting fittings. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, N. Y. C.

MACHINERY AND SUPPLIES WANTED

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Agents in all foreign countries.

United States Statistics

Imports for Consumption of Crude and Manufactured Rubber

	June, 1940 Quantity	June, 1940 Value	Six Months ended June, 1940 Quantity	Six Months ended June, 1940 Value
UNMANUFACTURED—*Free*				
Liquid latex (solids)....*lb.*	5,490,018	$1,004,007	42,110,112	$7,969,350
Jelutong or pontianak....*lb.*	872,497	146,196	6,731,233	933,914
Balata .....*lb.*	105,734	10,977	652,070	116,562
Gutta percha .....*lb.*	227,163	46,866	2,250,115	354,505
Guayule .....*lb.*	816,800	74,957	3,971,400	377,181
Scrap and reclaimed.....*lb.*	936,549	16,225	4,443,559	76,641
Totals	8,448,761	$1,299,228	60,158,489	$9,828,153
Misc. rubber (above), 1,000 *lbs.*	8,449	$1,299,228	60,158	$9,828,153
Crude rubber .....1,000 *lbs.*	114,404	20,019,581	739,944	128,446,285
Totals .....1 000 *lbs.*	122,853	$21,318,809	800,102	$138,274,438
Chicle, crude .....*lb.*	1,551,155	$515,818	7,778,148	$2,535,698
MANUFACTURED—*Dutiable*				
Rubber tires .....*no.*	3,100	$15,353	30,901	$190,200
Rubber boots, shoes and overshoes .....*prs.*	31,744	7,896	59,404	15,512
Rubber soled footwear with fabric uppers .....*prs.*	130,100	32,992	579,716	111,932
Golf balls .....*no.*	62,408	6,451	423,038	39,653
Lawn tennis balls.....*no.*	76,632	9,497	857,517	84,364
Other rubber balls.....*no.*	67,440	1,938	1,088,784	38,817
Other rubber toys.....*lb.*	.....	2,639	.....	17,359
Hard rubber combs.....*no.*	.....	.....	.....	.....
Other manufactures of hard rubber	.....	4,282	.....	12,999
Friction or insulating tape..*lb.*	5,535	4,758	34,154	23,398
Belts, hose, packing, and insulating material	.....	17,468	.....	54,687
Druggists' sundries of soft rubber	.....	1,040	.....	23,744
Inflatable swimming belts, floats, etc. .....*no.*	540	37	420,547	28,167
Other rubber and gutta percha manufactures	.....	24,789	.....	183,855
Totals	.....	$129,140	.....	$824,687

Exports of Foreign Merchandise

RUBBER AND MANUFACTURES				
Crude rubber .....*lb.*	1,396 191	$295,334	11,715,816	$2,344,838
Balata .....*lb.*	14,735	2,688	256,830	78,840
Other rubber, rubber substitutes and scrap.....*lb.*	5,597	784	165,413	22,774
Rubber manufactures (including toys)	.....	2,488	.....	27,333
Totals	.....	$301,294	.....	$2,473,785

Exports of Domestic Merchandise

RUBBER AND MANUFACTURES				
Reclaimed .....*lb.*	1,917,709	$87,418	14,814,742	$757,714
Scrap .....*lb.*	7,644,064	105,825	42,841,707	782,921
Cements .....*gal.*	33,361	51,731	236,695	303,620
Rubberized auto cloth.*sq. yd.*	33,309	14,106	130,575	60,117
Other rubberized piece goods and hospital sheetings.*sq. yd.*	220,102	70,409	1,160,854	405,015
Boots .....*prs.*	2,998	6,655	71,933	150,748
Shoes .....*prs.*	9,320	5,810	123,676	73,735
Canvas shoes with rubber soles .....*prs.*	60,963	51,586	306,179	246,759
Soles .....*doz. prs.*	4,190	7,036	25,409	48,951
Heels .....*doz. prs.*	15,636	9,726	145,949	86,054
Soling and top lift sheets..*lb.*	19,643	4,523	425,751	80,658
Gloves and mittens..*doz. prs.*	8,160	19,460	62,222	145,395
Water bottles and fountain syringes .....*no.*	23,294	7,871	153,656	52,313
Other druggists' sundries....	.....	62,002	.....	419,582
Gum rubber clothing.....*doz.*	19,406	38,798	116,445	282,333
Balloons .....*gross*	17,098	14,004	111,101	97,942
Toys and balls.....	.....	15,928	.....	67,191
Bathing caps.....*doz.*	4,188	8,063	32,197	55,964
Bands .....*lbs.*	19,034	8,196	121,014	58,057
Erasers .....*lb.*	20,432	11,154	149,747	86,710
Hard rubber goods				
Electrical battery boxes.*no.*	26,471	16,732	133,526	93,507
Other electrical.....*lb.*	40,399	15 531	282,534	115,993
Combs, finished.....*doz.*	16,912	10,207	114,769	62,599
Other hard rubber goods....	.....	14,920	.....	88,729
Tires				
Truck and bus casings.*no.*	34,365	720,982	198,869	4,118,611
Other auto casings.....*no.*	46,219	482,180	290,532	3,165,097
Tubes, auto .....*no.*	63,589	122,582	355 175	660,079
Other casings and tubes..*no.*	10,819	65,530	53,637	428,552
Solid tires for automobiles and motor trucks....*no.*	480	8,487	3,124	61,832
Other solid tires.....*lb.*	15,466	3,194	106,793	21,536
Tire sundries and repair materials .....*lb.*	212,257	57,287	1 461,783	409,283
Rubber and friction tape..*lb.*	73,959	18,187	445,115	123,503
Fan belts for automobiles..*lb.*	17,005	10,402	212,549	117,052
Other rubber and balata belts .....*lb.*	215,859	114,731	1,724,270	902,035
Garden hose .....*lb.*	76,151	15,597	447,207	81,247
Other hose and tubing....*lb.*	436,240	175,416	3,580,675	1,456,890
Packing .....*lb.*	135,912	57,862	724,908	353,907
Mats, matting, flooring, and tiling .....*lb.*	66,161	9,375	537,158	72,986
Thread .....*lb.*	41,185	25,809	511,717	358,845
Gutta percha manufactures..*lb.*	47,174	17,957	939,760	280,511
Latex (d.r.c.) and rubber sheets processed for further manufacture.....*lb.*	57,657	15,766	723,547	203,473
Other rubber manufactures..	.....	151,619	.....	1,260,444
Totals	.....	$2,730,654	.....	$18,698,490